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CONTENTS

Frontispiece and Sketch—Edward Morell Holmes 191
Editorial:
Pharmacognosy, To-day and To-morrow 196
Narcotics Constitute a Social and Medical Problem 197
Standardization of Pharmacy Schools 198
Heroes of Science 199
A Brief Review of the Crude Drugs Entered at the Port of New York during the Past Year—Schwarz 200
The Necessity of a Comparative Pharmacopoeia—Raubenheimer 204
The Effects of Large Doses of Cannabis Indica—Schneider 208
Toxicity of Neoarsphenamine. II—Heyl, Hart and Payne 214
Miscellaneous Chemical Papers—Sudro 219
Contributions to the Knowledge of Forest Products—Johnston, Merritt and Kremers 222
Volumetric Determination of Sodium Salicylate—Evans 225
Acetylsalicylic Acid—Gesell 228
The Biologic Standardization of Local Anaesthetics—Pittenger 229
Colloid Chemistry and Its Application in Pharmacy—Jordan 234
A Method for Assaying Unguentum Stramonii—Bliss, Jr., and Brown 240
Hot Extraction of Drugs—Scoville 241
Fluidextract of Ergot—Snyder 246
Stainless Steels in the Drug Store—Blumenschein 248
Mixtum Compositum—Raubenheimer 249
The Use of an Indicator in the Compounding of a Powder Prescription—Greenstone 250
History of the Apothecary Shop: A Bibliography—Kremers 252
The Modern Tower of Babel—Lehman 256
The Business Side of Pharmacy—Fischelis 259
Bibliography of Pharmaceutical Research—DuMez 261
Proceedings of the Local Branches 266
The Department of the American Conference of Pharmaceutical Faculties 270
Editorial Notes 273
Obituary 275
Societies and Colleges 278
The Pharmacist and the Law 281
Book Notices and Reviews 283
Advertising—Cover pages 2,3 and 4, and pages I to XVI.

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The 1923 meetings of the American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy will also be held in Asheville during the week of September 3.

For Association Roster see pages x, xii, xiv, and xv.

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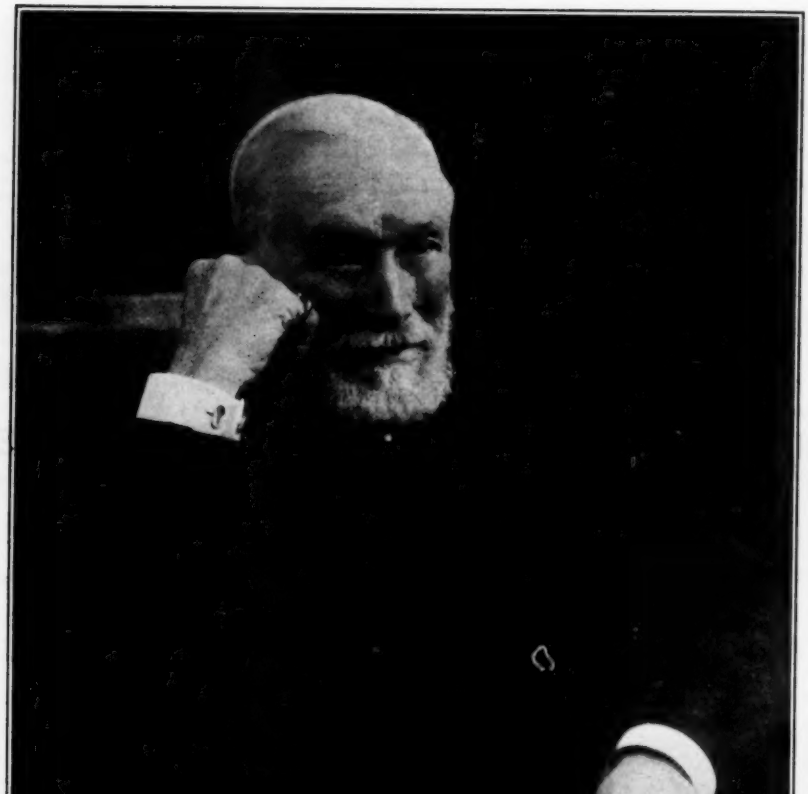

E. M. HOLMES

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XII MARCH, 1923 No. 3

EDWARD MORELL HOLMES.

When Edward Morell Holmes was elected president of the British Pharmaceutical Conference in 1899, a pharmaceutical editor said of him: "There are a few pharmacists in Great Britain whose friendship with Mr. Holmes has enabled them to discover his distinction apart from his office as curator of the Pharmaceutical Society's Museum. There are also a few, a *very* few, who only know him as a curator. When last year's Conference (1899) elected him president, that was done because the members liked him, but behind this was the fact that he has contributed more to the botanical side of British pharmaceutical literature than any other man living."

As a student Mr. Holmes earned the British Pharmaceutical Society's bronze medal for a herbarium of British plants; in 1877, he was awarded the Flückiger Medal, and in 1915, the Hanbury Medal. Last November he concluded a half-century of service as curator of the Museum of the Pharmaceutical Society of Great Britain; in January of this year he celebrated his 80th birthday. A year or more ago our honorary member met with a serious accident which resulted in the loss of a limb; in a recent communication which accompanied the photograph herewith, he wrote that he "tried to come up smiling!" He also referred with pride to the ring on his finger—which contains a new red fossil seaweed in a cornelian—"it retains its pink color and shows the cystocarpic fruit, and is apparently," he states, "a nitophyllum." He writes further that "it is the first cornelian I ever picked up, no such fossil alga has ever been found before! nor since!" While Mr. Holmes considers the collection and study of seaweeds a hobby he is an authority on the subject, and has been so known for many years. Probably twenty-five years, or more, ago he contributed a paper to the Linnean Society on "New Marine Algae from Japan," which was illustrated by exquisitely drawn figures by J. N. Fitch under Mr. Holmes' direction; more than twenty new species and varieties were described. Mrs. Holmes is also an enthusiast in the study and has accompanied her distinguished husband on many of his algae hunting excursions, aiding further with an artistic brush to complete and illustrate the records of their studies.

In complying with a request to submit data relating to the Museum, Mr. Holmes closes the accompanying note with the following: "All that I have been able to do has been to make the Museum respected by all who have visited, and really useful not only to students and members of the Society, but to all interested in pharmacognosy and economic botany in relation to drugs. That has been my life work, except for my private hobby, seaweeds. To the British Marine Flora I have added about 250 species new to Britain, and a few friends another 100, so that whereas the last standard work described 400 British species, there are now nearly double that number known."

In preparing a brief sketch of one who has contributed so largely to pharmaceutical and related literature—each one of the British Year Books for the past 50 years contains a number of abstracts of his contributions for the corresponding year—the realization comes that it is impossible to give more than the titles of contributions and this is superfluous because our readers have access to these references. Therefore, the further remarks will deal with the Museum, the history of which records some of the activities of the Curator, and also reflects his interest and devotion in serving others.

During the years 1842–1872, Professors Redwood and Bentley and Mr. James Collins were the curators. In these earlier years the Museum comprised not only specimens useful for teaching pharmacy, but many specimens of historical interest and not of value in the former connection. In 1850 a part of the Materia Medica collection of Dr. Pareira, consisting of 640 specimens, was donated to the Society. In 1851 contributions were made by Mr. D. Hanbury from the International Exhibition. In 1859, 300 specimens from the collection of the celebrated botanist, Robert Brown, were presented; in 1862, further collections of medicinal products from the International Exhibition of that year—derived from India, Turkey, Cape Colony and Manila. Many of the specimens of these collections had no great immediate value to pharmacy. Although an effort was made to catalog the specimens prior to the time of the curatorship of Mr. Holmes no great progress was made, but soon after his appointment the work of assorting and identifying the specimens was begun and the catalog was published in 1878. These collections have historical value and interest. Mr. Holmes referred to a number of them in a communication and liberty is taken in presenting these data, as reported by him, as a closing part of the sketch—for after all he has made the Museum as well known as the Curator of the past half-century.

COLLECTIONS OF THE MUSEUM OF THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

The collections referred to are as follows:—

1. A collection of old English drugs of the 17th century apparently presented by Dr. Maton, who at one time was President of the Linnean Society. These are contained in small bottles of greenish glass of crude workmanship.

2. Some years later a very complete collection of drugs of the same period, in an appropriate old mahogany cabinet, was presented by Messrs. Corbyn Stacey & Co. These drugs were stated to be used for examining their assistants before they were appointed as there were no official examiners in pharmacy in those days.

3. A collection of Chinese drugs in small boxes presented by Dr. F. Porter Smith in illustration of his work on Chinese Materia Medica. Many of these had been reduced to powder by the ubiquitous mal brour beetle so well known to pharmacists, but those that were left were preserved in stoppered bottles and form a most valuable set of specimens for identifying the drugs described by him and render it possible to determine that many of them were not correctly de-

termined botanically. It is, indeed, a wonder that, with the difficulty of access to botanical works in China at date, that he was able to correctly identify as many as he did.

4. To them were added the Chinese drugs described by D. Hanbury of which an account is given in the "Science Papers."

5. A very complete collection of Chinese drugs made by Dr. Hokai of Hongkong and shown at the Indian and Colonial Exhibition subsequently presented to the Society. The whole Chinese collection has had the advantage of being examined by Dr. Augustin Henry who was formerly under Sir Robert Hart and, as one of the best Chinese botanists, was able to contribute useful information concerning these drugs, having been Surgeon to the Chinese Customs.

6. A collection of Indian Drugs presented by Dr. W. Dymock in illustration of his papers on Indian drugs published in the *Pharmaceutical Journal* during the years 1876–1879.

In 1872 a Herbarium of British plants was commenced, so that students competing for the Herbarium prize might have the opportunity of personally identifying any plant collected by them. This collection is now practically complete and many alien plants of frequent occurrence in this country have been added. An herbarium of medicinal plants of all countries was also commenced, the few existing in 1872 consisting only of plants obtained from botanic gardens at Chelsea and Regent's Park contained in two folio albums. The herbarium now contains nearly all the medicinal plants at present obtainable, the latest addition being that of the Siamese Benzoin plants (*Styrax benzoides* Craib) from Dr. Kerr of Chiengmai, which arrived only this month. A catalogue of the Herbarium up to the date of issue was published in 1896, and then included 1153 species.

7. To this fine collection have been added the medicinal plants of the late Daniel Hanbury's Herbarium.

8. A complete series of the Eucalyptus species from Mr. J. H. Maiden accompanied by specimens of the Eucalyptus oils from Mr. R. T. Baker.

9. A collection of herbarium specimens of all the species of Cinchona cultivated in India and Ceylon from Dr. G. Bidie of Madras, together with specimens of their barks which have mostly been analyzed by the late Dr. Paul, and their analyses recorded in the *Pharmaceutical Journal*.

10. A collection of species yielding myrrh and gum arabic was presented by Dr. G. Schweinfurth.

11. A collection of essential oils presented by Messrs. Schimel & Co. of Leipsic of all the kinds manufactured by them.

12. The Dr. Hanbury collection of materia medica presented by the late Sir Thos. Hanbury. Many of the specimens were still unnamed at his death, but a number of these have been examined at my request, and reported on by continental histologists and subsequently identified, but only a MSS. catalogue of the collection has been prepared as the Council thought that in view of the small demand by pharmacists in this country for the 1878 catalogue of the Museum, it would be an unnecessary expense to publish it.

Two other collections of interest consist of (1) a collection of the native drugs of Madagascar collected by Dr. G. Parker during the time that he acted as physician to the Queen of Madagascar, and (2) a collection of the native drugs of Morocco presented by Dr. A. Leared and obtained by him from the Shereef of Morocco, a catalogue of these being published in his work on Morocco and the Moors.

A fine collection of Brazilian drugs, 250 in number, was presented by Dr. Domingo Parodi of Buenos Ayres.

But the collection of Foreign and Colonial Materia Medica was very largely added to by the specimens obtained by the Curator from the International Exhibition in Paris in 1878 and in the International Exhibition in this Country.

Among the countries already represented in the Museum are the United States, Mexico, United States of Columbia, Bolivia, Chili, the Argentine, British Guiana, Venezuela, W. Indies, Ceylon, E. and W. Africa, S. Africa, Egypt, the Straits Settlements, Java, Japan, etc. The specimens in some of these collections may be stated in round numbers as India 1000, China 1000, Japan 200, Ceylon 300, Natal 200, Cape Colony 100, so that the Museum is probably one of the richest of its kind in the world.

E. G. E.

EDITORIAL

E. G. EBERLE, Editor 253 Bourse Bldg., PHILADELPHIA

PHARMACOGNOSY, TO-DAY AND TO-MORROW.

FLÜCKIGER, speaking of pharmacognosy, has well said that it is "the simultaneous application of various scientific disciplines with the object of acquiring a knowledge of drugs from every point of view." But in the average modern school or college of pharmacy is more than one "scientific discipline" applied or is more than one "point of view" taken in the department of pharmacognosy? In the writer's opinion it can be safely said that 95 per cent. of the purely pharmacognostical training (excluding Materia Medica) is devoted to histology and morphology.

True, histology and morphology play an important rôle in the pharmacognosy curricula, and so they should. An intelligent searcher in the pharmaceutical sciences must be qualified to recognize the bast fibers, stone cells, starch grains and all other microscopical elements. Furthermore, he must know the morphological structure of the drugs. It is not the intention to belittle in any way the histological and morphological division of pharmacognosy. The microscope has always been the tool of the pharmacognosist and should always remain his most important one.

In the mad rush after the elusive little starch grain and the cell from whence it came, a phase which is growing daily more and more important is neglected—the chemistry of drugs. It is admitted that the subject receives due consideration in the lectures, but how much laboratory training is devoted to it in the pharmacognosy laboratories?

The chemist has borrowed the microscope and his field of microchemistry is rapidly assuming enormous dimensions. Is not the pharmacognosist justified in borrowing his test-tubes and his reagents?

The chemists of the U. S. P. revision committees have taken over the volatile oils, the fixed oils, the resins, balsams, etc., all of which are vegetable products and rightly belong in the realm of pharmacognosy—the pharmacognosist has, in pursuit of the revelations of his microscope, let them slip away from him. In the U. S. P. VIII there were over two hundred strictly vegetable drugs, that is, drugs consisting purely of plant parts; in the tenth revision there will be less than half that number. What is the significance of this? This is not a criticism of the Committee on Scope; there probably have been good and sufficient reasons for the deletions. But to the pharmacognosist is it not a "handwriting on the wall?"

The life and development of pharmacognosy are more or less dependent on the application of chemical principles. There is hardly anything new to be done along histological lines, while the field of "chemical pharmacognosy"—a term used for the want of a better one—offers great opportunities for the research worker in pharmacognosy. The first move to be made should be the introduction of drug assaying and pharmacopœial testing (as applied to vegetable drugs and the prod-

ucts derived from them) into the pharmacognosy laboratories. This will eventually lead to the more comprehensive field of phytochemistry, which should rightly be considered as a branch of pharmacognosy.

The warning has sounded. There may not be more than ten strictly vegetable drugs in the U. S. P. XII. Flückiger was right, "various scientific disciplines" must be applied, and more than one point of view must be comprehended in pharmacognosy. Surely, pharmacognosy is of importance—it should be preserved!

ELMER H. WIRTH.

NARCOTICS CONSTITUTE A SOCIAL AND MEDICAL PROBLEM.

THAT America is confronted with a narcotic problem of serious proportions in itself and of exceedingly great complexity in its details is emphasized in the first of a series of articles addressed to the public beginning with a preliminary presentation of some of its phases by Sidney Howard in the February number of *Hearst's International Magazine*. To the drug trade and pharmaceutical profession, the article by Mr. Howard contributes but little if anything that has not been reiterated by them on many occasions.

The revelations concerning the prevalence of narcotic drug addiction and illicit traffic in narcotic drugs now being made by Mr. Howard will shock the sensibilities of many citizens, stimulate anew the panacea propagandists represented by the professional reform elements, shake the confidence of illicit traffickers in their apparent security, strike some terror to the political appointees engaged to enforce our laws and regulations affecting lawful traffic in and usage of narcotics.

The article does a very timely and worthy service in pointing out in language plain enough for every one to understand that the appalling narcotic problem of America must be faced. The author discreetly avoids suggesting any means or method of solving it but really asks the American people to recognize the fact that we do have this problem and adds that it is their duty to face it, and they have a responsibility in ascertaining just what the problem is.

There are two complex questions upon which the problem appears to rest: (1) social and (2) medical. Solution seems possible only by clearly determining the exact relations of these two questions, learning just where the one begins and the other ends. Not all cases of addiction result directly from social uses of narcotics as a means of entertainment, the victual of debauching parties, or individual craving to experience the dreams of a Coleridge or De Quincey; likewise not all cases of addiction have their origin in medical treatment of disease. Yet there is abundant evidence tending to show that sooner or later many individual addicts become subjects of medical care, regardless of the manner in which they secured their first supplies. It thus appears that in nearly every case of narcotic addiction there is a point where the ordinary social corrective measures of isolation, commitment and punitive treatment cease to be effective. Again many successful medical cures of narcotic addiction have been undermined when patients have been discharged only to return to an environment rich in the companionship of the pipe, the needle, and the "sniff." The problem therefore cannot be solved until some means are devised whereby (1) the addict needing medical care can be properly treated as an individual patient, and (2) upon discharge from such care

the individual can be kept from an environment conducive to a return of the social custom of dope usage.

Of one thing Mr. Howard seems to be certain, namely, present restrictive legislation and regulation of the legitimate and law-abiding drug trade have not reduced narcotic addiction but have multiplied activity among illicit dealers who have not hesitated to adulterate their wares and profiteer on a weakened and suffering clientele. Pharmacy as a whole has most commendably observed the spirit and letter of existing narcotic control and regulatory laws both state and federal. Pharmacists and the drug trade would do well to heed the thoughts contained in Mr. Howard's article and for the present, at least, withhold action aimed to bring about new laws until there is a more definite knowledge of what the narcotic problem really is. When that becomes known then it will be time to consider further legislative or other means of solving it. Additional legislation either state or federal cannot at the present time correct the condition, and might seriously impede progress looking toward a scientific study of the subject.

C. H. W.

STANDARDIZATION OF PHARMACY SCHOOLS.

THIS comment is not intended to support the idea of standardizing pharmacy schools, nor to oppose the plan ably presented in the Department of the American Conference of Pharmaceutical Faculties. Brief references only will be made to entrance requirements as a basis for classification and to the products of the schools, without touching on the great work in these teaching institutions during the intervening years when the students are prepared for taking part in professional and commercial activities and citizenship in general.

A leading estimate of an institution for teaching pharmacy is, quite naturally, based on the quality of the student body—whether those only are accepted as students who have had the preliminary educational training that will enable them to master and apply the sciences, acquire the technic of pharmacy, and give reasonable assurance that the ideals of pharmacy will be comprehended by them.

If further standardization of schools of pharmacy than that provided for by the American Conference of Pharmaceutical Faculties, and under provisions of State Boards of Pharmacy, is deemed advisable and necessary, conditions and needs should and, doubtless, will receive careful consideration. Under such provisions the demand for certain definite preliminary educational qualifications of entrants would probably be accepted by most of those engaged in teaching pharmacy as one of the readiest and best means for standardizing the schools; the high schools offer the gauge that is reasonably adaptable, even though uniformity in methods and results does not obtain. Time and experience will be required to perfect rules that may be proposed and approved for classifying schools of pharmacy, and general adoption of graduation prerequisite by states will be very helpful, almost essential.

The facilities of schools differ; members of teaching faculties do not all have the same degree of success in communicating knowledge and instructing learners in technic. The first semesters of a pharmacy course must be given to the preparation of students for the practice of pharmacy; the later periods afford opportunities for selective studies and work, and for schools to develop the courses which

they hope will distinguish them—a classification which to some extent affects the question of standardization. E. G. E.

HEROES OF SCIENCE.

THE French commission endowed by the Carnegie Foundation several years ago awarded gold medals to Doctors Charles Infroit, Adolph Leray and Charles Vaillant. The two former died soon thereafter, as a result of their X-ray research work; the latter had undergone a number of serious surgical operations; when, recently, the grand cross of the French Legion of Honor, the gold medal of the City of Paris, and the Carnegie medal for heroism were pinned on his breast the hero stood with pinned-up sleeves, for both his arms have been amputated. The American Ambassador, Myron T. Herrick, in an address of the occasion, said that Andrew Carnegie had done nothing to meet a truer need than to institute a medal recognizing heroism, but in this case it was a feeble recognition of sacrifice and abnegation. Dr. Vaillant has worked almost without respite for twenty-five years, since which time he has applied himself almost exclusively to the study of Roentgen ray.

Prof. Wilhelm Konrad von Roentgen died in Munich, February 10. He did not attach his name to the ray discovered by him, but named it the "unknown" ray; he had the opportunity of profiting largely by the discovery, but gave a knowledge of it to the world. He was graduated at Zurich, and became professor of physics at Strasbourg, later at Giessen and Würzburg, and finally at Munich. His great discovery was made at Würzburg in 1895. He also was injured in his laboratories, but his sacrificial service was in contributing to science a powerful tool of the physicist, chemist and surgeon—the roentgenologist.

Pasteur replying to a young scientist's complaint said: "The discouragement in your last letter is not worthy of a scientific man." Erwin F. Smith states that the greatest work Pasteur did was that in the 27 years following a paralytic stroke—he gradually recovered, "was able to limp about, undismayed and thrice determined."

So our own Major-General Gorgas might be mentioned, Lazear, Finlay, Agremonte, Reed, etc., and the sacrifices of unknown heroes, unknown as sacrifices of their laboratories and work among the afflicted.

"The world's neglect of its men of science" was the theme of Colonel Sir Ronald Ross before the British Science Guild, February 27. He said: "The genius who saved countless lives in India by discovering methods of inoculation against cholera and plague is not employed by Great Britain in any capacity whatever to-day."

"Walter Reed, the young American who discovered that yellow fever is carried by the mosquito, was given a menial medical job after his discovery that left him in his final illness a prey to harassing anxieties for the future of his family."

The philanthropist is learning that the advancement of medical science confers the greatest and most lasting benefits on man. The heroes of science impress their belief in the value of their service on the world—a more forceful way is impossible. There is a widening field of medical science before us in which medicine, chemistry, and the departments of special and direct concern to pharmacists have great opportunities. E. G. E.

A BRIEF REVIEW OF THE CRUDE DRUGS ENTERED AT THE PORT OF NEW YORK DURING THE PAST YEAR.

BY L. J. SCHWARZ.

The Pharmacognosy Laboratory in the New York Station of the Bureau of Chemistry is primarily concerned with the control of import shipments of crude drugs and spices. Since most of these products find their way to our markets through the port of New York, it was thought that a brief review of the findings of that laboratory would prove of interest to this Association.

During the past year we examined approximately 3500 shipments of crude drugs. In spite of the fact that we could not examine all of these importations minutely, we, nevertheless, found it necessary to recommend to the Chief of the New York Station detention action on 210 shipments because they did not comply with the prescribed standards. The shipments thus detained were reëxported, destroyed, reconditioned or released on affidavit of the buyer that the goods in question were used only in a specified manner.

The large number of detentions might justify the belief that the crude drugs offered for entry at the Port of New York were of unusually poor grade, but that is not at all the case. In fact, there has been an improvement in the quality of most of our imported crude drugs during the past few years. The one feature that is clearly brought out is the necessity of this control work. It is hoped that during the coming year the Pharmacognosy Laboratory may be able to further increase its activities, not only along the regulatory lines, but also in the field of research, assisting the crude drug interests in solving their problems in connection with drug substitutes, new drugs, and the authenticity of alleged recognized drugs from new sources of supply.

The sub-standard drugs examined during the year were not confined to any one class or to a few items. In reviewing these, therefore, it will be most convenient to group them and to mention only those that were found to be more or less frequently below standard or which for other reasons might prove to be of interest.

ROOT DRUGS.

(ROOTS, RHIZOMES, ROOTS AND RHIZOMES, TUBERS, ETC.)

Some of the Belladonna Root which was recently offered for entry was of very poor grade, consisting largely of stems, stem bases and old hollow roots. One large lot in particular appeared to have been made up of offals, since it contained only an occasional piece of prime, sound root. Another importation proved to be rather interesting in that it consisted predominantly of Poke Root, showing that Poke Root is again being used as an adulterant for Belladonna Root.

As for Ipecac, both the Cartagena and Rio varieties were found to be of good quality for the most part. Only a small quantity fell below the prescribed alkaloidal standard. One lot of spurious root only remotely resembled Cartagena Ipecac. It gave a negative test for alkaloids and as yet has not been identified.

The Jalap imported during the year was not especially high in resin content, particularly the more recent shipments. Of the lots lately analyzed, none were found to exceed 8% of resin, and several contained only 6%, or less.

Most of the Licorice brought in was not as good as it has been. A lack of care in the collecting and curing of this drug is evident from the presence of stems, and poorly dried, mouldy and partially decomposed roots.

There has been a marked improvement in the quality of Sarsaparilla Roots. Much of the Mexican root now finding its way here is so clean that it seems to have been washed. Occasional lots, however, were very dirty, yielding as high as 19.5% of ash.

Other root drugs which were found to be at variance with the prescribed standards were Burdock Root, for which was substituted the woody root of the second year's growth; Couch Grass, which contained an excess of stems and was high in ash; Orris Root, extremely mouldy; Valerian Root for which was substituted a spurious root; and Rhubarb, which was low in aqueous extractive and high in roots having dark central areas.

BARKS.

For the barks, there is little of interest to be said, from a control point of view. With the exception of Cascarilla and Cinchona, most of the widely used official barks are produced in this country.

Samples of Cascarilla Bark examined, however, contained as much as 30% of wood and stems. The Cascarilla Siftings, a by-product in the preparation of the bark, frequently offered for entry, are invariably dirty and may yield anywhere from 15–60% of ash.

All of the Cinchona brought in did not measure up to the U. S. P. requirements. Four lots were detained because the bark in question was spurious. These were identified by the Pharmacognosy Laboratory at Washington as being derived from *China bicolerata*. Of course, some low-test Cinchona was also received.

LEAF DRUGS.

(LEAVES AND FLOWERING TOPS, LEAVES AND LEAFLETS.)

Buchu was adulterated with the leaves of *Barosma ovatum*, *Barosma crenulata* and *Empleurum ensatum*. In addition to this, shipments high in stem content and ash were examined.

Several very recent lots of Belladonna Leaves were adulterated with Scopola and Digitalis Leaves.

Egyptian Henbane (*Hyoscyamus muticus*) has been brought in for the official Henbane. Several recent importations were found to consist for the most part of rosette leaves which were very low in alkaloids.

The Stramonium leaves analyzed were of poor quality, being usually very dirty and adulterated with *Xanthium strumarium*, *Hyoscyamus niger*, *Plantago major* and large stems. The alkaloidal content usually came within the U. S. P. requirements, although in some cases it fell to 0.18%.

Greek Sage (*Salvia triloba*), which is generally conceded to be decidedly inferior to the official in both taste and odor, was substituted for sage.

Several of the Marjoram shipments recently brought in were grossly adulterated with a variety of Cistus leaves, very probably *Cistus albidus*. One lot contained approximately 50% of this adulterant.

Other leaf drugs found to be sub-standard were Senna leaves, particularly the Senna Siftings, which contained excessive quantities of sand, and Thyme which was adulterated with *Thymus Zygii* and *Origanum vulgare*.

FLOWERS AND FLOWER PARTS.

In reviewing the group of drugs which comprises the flowers and flower parts, Matricaria stands out as the most conspicuous offender against the Purity Rubric

of the Pharmacopœia. Matricaria importations throughout the year were by no means fancy, most of the lots consisting of badly broken flowers. Sub-standard lots were detained because they were adulterated with the flower heads of *Maruta cotula* (Dog Fennel), or because they contained excessive quantities of stems or earthy matter.

Several lots of Saffron were also found to be below standard. Here the chief causes of inferiority were the presence of excessive amounts of yellow styles or moisture. One importation contained approximately 20% of moisture.

The very poor grades of Lavender and Malvae flowers examined owed their inferiority to high leaf and stem content or to the fact that many of the flowers had already gone to seed.

FRUITS AND FRUIT PARTS.

Several members of this group of drugs were frequently sub-standard. Capsicum is one of them. Some shipments of this drug contained as much as 60% of wormy and mouldy fruits. Only occasionally was a lot sub-standard because of the presence of an excessive quantity of stems and calyxes.

Cubebs have given a great deal of trouble during the year because they were consistently adulterated. The chief adulterants were the so-called stems and the fruits of *Piper ribesioides*. Occasionally, however, spurious sessile fruits were also found. Some analyses have shown the presence of thecaphores to the extent of 15% and spurious fruits to the extent of 63%. It is felt that an improvement in the quality may be looked for as the producers are more familiar with our requirements.

Several lots of Colocynth pulp were detained because of an excessively high seed content. One lot contained 38% of seeds and epicarp.

Of the Umbelliferious fruits, Anise, Coriander, Cumin and Fennel were very frequently sub-standard, particularly Anise, most of the recent importations of which were detained. Of the Levant variety not one sample complied with the requirements of the Pharmacopœia, and only occasionally did the Spanish variety measure up to the standard. Anise was denied clear entry for the most part because of the presence of excessive earthy matter, the ash yield usually being more than 13%. Other factors contributing to the inferiority of this drug were high immature fruit content, and the presence of stems and foreign organic matter in which the fruits of Coriander and the seeds of various grasses generally predominated.

The Coriander brought in, especially that which came from Morocco, was of very poor quality. It consisted for the most part of old crop goods or a mixture of old and new crop fruits. Practically every shipment contained bored fruits, frequently to the extent of 10%. In addition to this, some of the lots held as much as 10% of foreign matter which usually consisted of Fenugreek and cereals. The Coriander crop in Morocco last year was practically a failure, which no doubt accounts for the poor quality of the offerings from that country.

The chief objection to the Cumin seed offered for entry throughout the year was that it contained too much earthy matter. Most of the shipments were detained on these grounds and held until they were properly cleaned. It was a pleasure to note that the most recent arrivals were of excellent quality and clean.

The condition of the Fennel imported resembles that of the Anise. The French variety especially was often found to be high in ash, one sample containing more than 17%. As a rule, this variety also contained an excess of organic foreign matter,

usually stems and very immature fruits. Bitter Fennel (*Foeniculum piperitum*) was substituted for the official Fennel in one shipment.

SEEDS.

Nothing of interest developed in the seed group throughout the entire year. Several lots of Mustard Seed were detained because they contained up to 14% of foreign seeds; Jambul, because of the presence of stones and because of its wormy condition; Dandelion Seed, because of its high chaff content; and Caustis Barley because it contained an excess of earthy matter.

SPORES AND TRICHOMES.

The spores and trichomes which are used as drugs and those examined in the laboratory include Lycopodium, Lupulin and Kamala. The Lycopodium which came in during the early part of the year was excellent, with the exception of one lot which contained 80% of chalk. The more recent shipments, however, were not of U. S. P. caliber, and contained small quantities of rye starch, spore cases, and inorganic matter. One sample yielded more than 8% of acid-insoluble ash.

All of the Kamala recently imported contained an excessively high ash content. Three out of four lots showed an ash content twice as high as that permitted by the standard.

Most of the Lupulin examined had a fine color and odor. Only a few lots were denied entry because of their high sand content.

GUMS, RESINS, AND GUM-RESINS.

Acacia and Tragacanth usually conformed to the U. S. P. standards. Only an occasional lot of Tragacanth was excessively dirty, and the only fault we had to find with the Acacia was the presence in several lots of a gum that produced a very dark-colored solution. While the substituted gum was in all probability the product of an Acacia from the interior of Africa, it was manifestly not the product called for by the U. S. Pharmacopœia.

Unfortunately, the Karaya Gum offered was not always of good quality. The low-grade gum usually had adhering to it wood or bark, samples of which yielded as much as 1.89% of crude fiber.

Siam Benzoin importations received throughout the year were excellent, but the Sumatra variety was frequently sub-standard, some samples yielding as little as 62% of alcohol extractive. The most recent importations of Sumatra Benzoin, however, complied with our present standard in every particular.

Guaiac generally contained liberal quantities of wood and bark, which of course was reflected in the alcohol-insoluble value. One lot contained 56% of alcohol-insoluble matter and only 4.2% of ash. As a rule, this drug did not yield excessive ash.

Myrrh, too, was not infrequently sub-standard, being at variance with the requirements with respect to both alcohol solubility and ash.

With respect to Asafoetida, the importations throughout the entire year were practically nil at the Port of New York. This probably is due to the fact that during the preceding year there was a heavy importation of this drug, much of it coming here on consignment.

This, in brief, reviews the crude drug situation as seen from the Pharmacognosy Laboratory at the New York Station.

But very few shipments of sub-standard drugs are destroyed. Most of them are either reëxported or reconditioned in such a manner as to bring them up to standard. During the coming year the Pharmacognosy Laboratory will endeavor to do all it can to assist importers in working out economical methods for reconditioning such sub-standard importations as may be received from time to time. This will not be done to encourage buying low-grade drugs abroad, but mainly to mitigate a financial loss which might accrue to the importer, and also to make available for this market drugs which otherwise would be lost to it.

In conclusion, it is a pleasure to state that practically all of the drug importers in the city of New York have voiced a willingness to coöperate with us in the conduct of this drug control work. With their hearty support, much can be accomplished. It is, therefore, with confidence that we can look forward to the work of the coming year, and feel reasonably sure that the consumer will have available to him standard crude drugs of uniformly good quality.

THE NECESSITY OF A COMPARATIVE PHARMACOPŒIA.*

BY OTTO RAUBENHEIMER.

Uniformity in medicines, as to strength and physical properties, has been the desideratum from time immemorial. This is how formulas were originated in local communities, in districts, in states, and later in entire countries. The desire for uniformity gave birth to our National Formulary in 1888, an everlasting credit to the A. Ph. A.

From the collection of formulas by the old medical writers, formularies, dispensatories and pharmacopœias originated. From such a collection (Formulæ Selectorium Pharmacorum) by Valerius Cordus the city of Nuremburg in 1546 published that celebrated *Dispensatorium*, the first legal pharmacopœia of its kind. With the principal object of creating uniformity the pharmacopœias of cities extended over states, countries and nations. This desire for uniformity gave birth to our U. S. P. in 1820, to the British Pharmacopœia in 1864 (from the London, Edinburgh and Dublin Pharmacopœias), and to the German Pharmacopœia in 1872, and to all national pharmacopœias.

As is to be expected, a number of drugs, and especially preparations, vary in strength and composition in the different pharmacopœias from all parts of the world. Examples of this sort are the following:

The *Pharmacopœa Universalis* of 1828 is a compilation of 34 pharmacopœias, of which 28 contain formulas for Tincture of Cantharides, which not only differ as to modus operandi, namely, maceration or digestion, or the time, from 2 to 14 days, or the alcoholic strength, from 50% to 90%, but what is most important of all, as to strength of the finished tincture, which varies from 1:6 to 1:96. This means that the ratio in the different tinctures of cantharides is 1 to 16.

As a teacher the writer holds up the following variations in strength, before the Brussels Protocol, September 1902, as vivid examples to his students:

Pulv. Doverii—8.8% Sp., 14.3% Aust. and It., 16% Belg., 10% others.
Tinct. Strophant.—2.5% Brit., 5% U. S., 20% Fr. and Mex., 10% others.
Tinct. Aconit.—5% Brit., 20% Fr. and Hung., 35% U. S., 10% others.

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* Scientific Section, A. Ph. A., Cleveland meeting, 1922.

HCN Dilut.—1% Jap., Fr. and Mex., 2.5% Belg., 10% Sp. and Port., 2% others.

Syr. FeI_2—0.5% Belg. and Fr., 1% Mex. and Helv., 5% Ger., 10% U. S., and others, and 12.2% Hung.

If we include in the last also the Greek Ph., which merely contains 0.0052% FeI_2, we have a ratio of 1:234 in the variation of the FeI_2 content in Syrupus Ferri Iodidi of the different pharmacopœias, an illustration which is also quoted by the celebrated pharmacologist, Professor Ewald, in the preface to the 13th edition of his *Arzneiverordnungslehre.*

Numerous attempts have been made to create uniformity and as a chief remedy the publication of a universal or International Pharmacopœia has been proposed. I will quote here the principal publications since the 16th century:

Nicolas de Prevost: *Pharmacopée Générale,* Tours, 1505.

Horstius: *Pharmacopœa Galeno-Chymica Catholica,* Frankfurt, 1651.

Nicolas Lémery: *Pharmacopée Universelle,* Paris, 1607.

James: *Pharmacopœa Universalis,* London, 1747.

Reuss: *Dispensatorium Universale,* Strassburg, 1786.

Brugnatelli: *Farmacopœa Generale,* Pavia, 1802.

Codex Medicamentarius Europæus, Lipsiae, 1819–1822.

Jourdan: *Pharmacopée Universelle ou Conspectus des Pharmacopées,* Paris, 2 vol., 1828, 2 edit., 1840.

Pharmacopœa Universalis oder Übersichtliche Zusammenstellung der Pharmakopöen, Weimar, 2 Bände, 1828–30; 2 Aüfl., 1832; 3 Aüfl., 1838–40; 4 Aüfl., 1845–46.

Geiger & Mohr: *Pharmakopœa Universalis,* Heidelberg, 2 Bände, 1836–45.

Kodex der Pharmakopöen, Leipzig, 1843–1847.

Bruno Hirsch: *Universal-Pharmakopöe,* Bd. I, Leipzig, 1887, Bd. II, Göttingen, 1890; 2 Aüfl., Göttingen, 1902.

That uniformity in medicine and the compilation of an International Pharmacopœia are very important subjects can be seen from the fact that every International Congress of Pharmacy brought up this matter for discussion and action. As early as 1865 the first International Congress of Pharmacy at Braunschweig declared itself in favor of an International Pharmacopœia, "or at least a uniformity in the formulæ of galenicals." A number of attempts were made, of which I will name the principal ones.

Robinet & Mialhe: *Codex Universal,* prepared by the Société de pharmacie in Paris and submitted to the III Congress in Vienna, 1869.

Méhu: *Pharmacopée Universelle,* submitted to the IV Congress in St. Petersburg, 1874.

Waldheim: *Projectum Pharmacopœæ Internationalis,* containing 293 articles, especially potent remedies, submitted to the VI Congress, Brussels, 1885.

Many efforts were made, much work was done, lots of money was wasted, but no results were accomplished. Perhaps for that reason Prof. C. T. P. Fennel, with his usual "pep," introduced the following resolution at the 41st annual meeting of the A. Ph. A. in Chicago, in August 1893, during the week preceding the VII International Congress of Pharmacy:

"Resolved that the sum of one thousand dollars be and is hereby appropriated to be placed at the disposal of the Seventh International Congress of Pharmacy by the Council of the A. Ph. A., for the compilation, publication and distribution of an International Pharmacopœia."

Prof. Oscar Oldberg, chairman of the committee, in his Report of the Congress, given to the 42nd annual meeting of the A. Ph. A. at Asheville, N. C., in September 1894, stated:

"The Congress appointed a committee of three to take steps for the appointment of an International Pharmacopœia Commission to compile, publish and distribute an *International*

Pharmacopœia of Potent Remedies, and it accepted with thanks the offer of this Association of the sum of $1000.00 to help to pay the expense of compiling, publishing and distributing this Pharmacopœia of Potent Remedies. The said Committee consists of:

Prof. Joseph P. Remington, Philadelphia, Chairman.
President Michael Carteighe, of the Pharmaceutical Society of Great Britain.
Apotheker Anton Schürer von Waldheim, of Vienna."

At the VIII International Congress at Brussels in 1898, and the IX in Paris in 1900, no further steps were taken, and with the death of the active Anton Schürer von Waldheim, August 13, 1899, the live soul of this project, the subject of an International Pharmacopœia was also buried.

There are many objections to such a work; the principal ones I will quote, as follows:

1. It would be entirely too voluminous should it contain all the drugs, chemicals and preparations of all countries.
2. Each nation prefers to use products of its own country; for instance, the United States prefers Cottonseed Oil, Italy Olive Oil and Russia Sesame Oil; Germany prefers Rhine Wine, France Bordeaux and the United States California Wine (provided the Prohibition Department permits it).
3. Each country adheres, in fact clings with the tenacity of a bulldog, to certain pet formulas or preparations and refuses to give them up.
4. Why should pharmacists and physicians overburden their knowledge with drugs and preparations of which they never heard and for which they have no use whatsoever?

However, the various attempts for an International Pharmacopœia culminated in the *Conférence internationale pour l'unifaction de la formula des médicaments heroiques*, held at Brussels Sept. 15–20, 1902, the adopted resolutions being commonly known as the Brussels Protocol. Signal service was thus rendered, at least as to uniformity of potent medicines in the various pharmacopœias. The U. S. P. VIII was one of the first to adopt some of these international standards, more of which were adopted in the U. S. P. IX. The latter on pp. LIII to LVIII also contains a table in which the standards of drugs and preparations in U. S. P. VIII are compared with those of the International Protocol. The much-desired uniformity was thus created at least as to potent remedies; for instance, Potent Tinctures (10%), Arsenical Solutions (1%), Diluted Hydrocyanic Acid (2%), Syrup Ferrous Iodide (5%), etc.

While the International Protocol has created uniformity in potent remedies, we should go further and also have more international uniformity in drugs, chemicals and galenicals. If the standards differ the therapeutic actions will also differ. As chairman of the Section on Practical Pharmacy and Dispensing I arranged a Symposium on the Pharmacopœias of the World at the 58th Annual Meeting of the A. Ph. A. in Richmond, Va., in May 1910. An entire session was devoted to this, to the entire satisfaction of the members. In my address on this subject (PROCEEDINGS, Vol., 58, pp. 1135–1139) I presented a number of illustrations in which the Pharmacopœias of the world differ and in which uniformity is very desirable. There are at present 26 Pharmacopœias official, but no one individual can own them all, or at least can read or understand them all. What is needed is a *compilation of the standards of the existing Pharmacopœias*, a so-called *Comparative Pharmacopœia.*

Such a work did exist at one time, namely, *Die Verschiedenheiten gleichnamiger officineller Arzneimittel*, by Dr. Bruno Hirsch, Apotheker in Dresden, published in 1895 by Ferdinand Enke, Stuttgart, a book with which some of the members of

the A. Ph. A. are acquainted. In 331 pages, and frequently in tabular form, Hirsch presented the variation of drugs, chemicals and galenicals official in 20 Pharmacopœias. The excellence of the work is unquestioned and personally I have derived much benefit from it during the revision of the U. S. P. and N. F., in other scientific work and in the dispensing of foreign prescriptions. However, the book is now antiquated, as 18 out of the 20 Pharmacopœias have since been published in new editions.

A short time ago it came to my notice that a German scientist has been working on the compilation of such a book, namely, Dr. A. Falck, Professor of Pharmacognosy and Pharmacology at the University of Kiel, and Director of the Pharmacologic Institute. Out of his own means and under great sacrifices one part of the work has been published—*Die Arzneibücher vergleichend besprochen* (The Pharmacopœias, reviewed and compared), Verlag Johann Ambrosius Barth, Leipzig. With the usual German diligence and thoroughness Dr. Falck presents in a condensed space of only 140 pages a critical, comparative review of all of the existing (26) Pharmacopœias, their titles, language, editions, supplements, legal power, general principles and introductions. Under the Pharmacopœias proper he compares the titles, monographs, galenicals, chemicals and drugs of the mineral, animal and vegetable kingdoms. Even abbreviations, doses, maximum doses and also the indices are compared. Truly as a scientist and an idealist the author deserves great credit for the publication and compilation of this book.

This is but one part of Dr. Falck's work, the second one being *a comparison of the botanical drugs of the various pharmacopœias*. This has been ready in manuscript for some time, but owing to the extremely high cost of paper and printing its publication has been delayed until proper financial aid can be secured. The writer is fully convinced of Dr. Falck's unselfishness and has consequently pledged his "mite" to the good cause. Should any other members of our great A. Ph. A. care to support this good cause I should be pleased to hear from them. This paper is not written to solicit subscriptions but to prove the need of an up-to-date "Comparative Pharmacopœia."

In conclusion I try to point out the

Advantages of a Comparative Pharmacopœia.

1. Ready reference showing the existing differences in the various Pharmacopœias.
2. Contains in one book the 26 Pharmacopœias of to-day.
3. Immense value to the Revision Committees of the U. S. P. and N. F. and all Pharmacopœia Commissions.
4. Great profit to importer, exporter and wholesaler by becoming acquainted with the standards of other countries.
5. Colossal service to the teacher in his lectures to his students.
6. Vast advantage to the writer in his papers for his readers.
7. Considerable importance to the author in the compilation of his books.
8. Enormous use to the research pharmacist, chemist and pharmacognosist in their work on these subjects.
9. Great value to the dispensing pharmacist in the compounding of foreign prescriptions, the formulæ and standards of which frequently differ.
10. Last, but not least, such a work possesses an immense educational value, as from the differences in other Pharmacopœias, be they advantages or disadvantages, we can all learn!

Let us have a Comparative Pharmacopœia!

BROOKLYN, N. Y.,
AUGUST, 1922.

THE EFFECTS OF LARGE DOSES OF CANNABIS INDICA.*

(SUBJECTIVE EXPERIMENT.)

BY ALBERT SCHNEIDER, M.D., PH.D.

Much has been said and written about the effects produced upon the human mind by large doses of *Cannabis indica*. The reports of lay writers (mostly writers of fiction and newspaper reporters), and of the unfortunates who are addicted to the drug, are fairly uniform as to the stimulating (?) effects and the ultra-mental exaltation. Writers on drug action have little to say about, or express doubts as to such effects and suggest that probably the Oriental mind alone reacts in so remarkable a manner. These doubters could easily arrive at definite conclusions through a few subjective tests with the drug.

It has been suggested that the Islam religion is founded in Cannabis action. It is a fact that the Mohammedan appears to manifest a special predilection to this drug but that may after all be mere coincidence and certainly a matter aside from the purpose of this report.

Among American medical writers, the late Horatio C. Wood reports in detail the effects of a single large dose of Cannabis on himself. The exact amount of the dose is not given and it is stated that it was the fluidextract made of the American-grown hemp. Among the pharmacologists, Sollman and Cushny refer to the intoxicating and exhilarating effects produced by Indian hemp, but make no mention of having tried it out on themselves. The reports by lay writers are of little value from the scientific standpoint and many of them make no distinction between actual sensations experienced and sensations which they imagined they experienced. The following report, it is hoped, will add to our knowledge of the mental effects produced by large doses of *Cannabis indica*.

It was the original intention to repeat the tests to a final conclusion, but after the fourth major test as herein recorded it was decided to discontinue all further subjective experimentation with this drug, not because of fear of possible permanent harmful effects, nor of the fear of becoming an addict, but because of the conclusion arrived at that any number of additional tryouts would not greatly alter the conclusions which might be drawn from the tests. Besides, other more important tests and experiments occupied writer's time and attention. It is necessary to add that experimenter had never before made subjective tests with a narcotic drug, is not addicted to narcotic drugs of any kind whatsoever (inclusive of tobacco), and is a moderate user of tea and coffee. He is fairly sensitive to the action of drugs in general, but is especially sensitive to the action of tobacco and also quite sensitive to the action of atropine. The following is a brief report of the tests made.

FIRST TEST.

(OMAHA, NEBRASKA. MAY 3, 1921.)

9:20 P.M.—Took about 3 cc of a fresh fluidextract of *Cannabis indica* obtained from Lathrop's pharmacy. Pulse 63 (which is normal), respiration 18 (normal). I am in a room in a private residence. Had a rather light dinner at 6:00 P.M. In good health.

9:30 P.M.—Pulse 62, fuller than at 9:20. Respiration normal. Experienced slight difficulty in keeping my mind on the count of the pulse. Some slight mental perturbation. Music down stairs (player piano) somewhat disturbing. Some sensation of gastric warmth.

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* Scientific Section, A. Ph. A., Cleveland meeting, 1922.

9:40 P.M.—Pulse 59, rather weak and slightly irregular. Respiration somewhat irregular and disturbed. Tendency to forget impressions momentarily. Some mental disquietude. Hands and face feel warm but not flushed or dry.

9:50 P.M.—Pulse 63 and a little stronger than at 9:40, but heart action somewhat labored and irregular. Mentally apprehensive and disturbed. Precordial oppression.

10:00 P.M.—Pulse 64, fair. Breathing somewhat difficult. Mental worry and feeling of oppression and of apprehension marked. Knee reflex somewhat increased. At this time I make a resolve to discontinue all subjective experimentations in the future.

10:10 P.M.—Pulse 62, fair. Respiration nearly normal again. The feeling of oppression and of apprehension comes and goes in flashes and is very pronounced. Slight giddiness. Have reached the conclusion that the assertions made as to the exhilarating and stimulating effects of Cannabis, as recorded by various writers, are all wrong. Completely conscious of self and of surroundings. Very transient death fear.

10:20 P.M.—Pulse 66, full and strong. Too much disturbed mentally to note respiration. Momentary amnesia. A few indescribable mental flashes. Skin becoming somewhat moist. All of the senses keener, vision especially. Still conscious of self but realize the need of self-control. The idea of duality or of a second self develops. Fully conscious of my environment. Note that some one is moving about in an adjoining room, and that some one is coming up the stairs. At this time I reach the conviction that there is a Cannabis action. General excitation and slight trembling of the hands. Quite suddenly there is developed an indescribable feeling of exaltation and of grandeur. The words "fine," "superfine" and "grand" come to mind as being applicable to the feeling. This indescribable feeling is purely subjective. Self-consciousness is completely anihilated for the time being. The concepts time, space and place have vanished. The confines of my room are no longer existent. I say to myself, "If this drug can produce such marvelous effects, I will certainly take it often." Recollect in flashes that I must exert self-control. I apparently exist in limitless space and my second or "astral" self is everywhere, now here, now in remote lands and again it cannot be located in any particular spot or place.

10:30 P.M.—Pulse 74, full and strong. No time for noting respiration, though it was quite irregular. All mental oppression and apprehension is gone. Self-consciousness has returned and the wish is expressed that the feeling of exaltation might return. At the very next moment it has returned grander than ever before. I am somewhat amused at the feeling of exaltation because I am satisfied that it is without real basis or cause. Mouth and lips are becoming quite dry. I make an attempt to explain this very remarkable drug action but am unable to formulate any conclusion. (At this point my pencil record ends in an illegible scrawl. The ever-varying mental effects cannot be recorded.)

10:40 P.M.—Unable (due to excited state) to record the pulse rate and respiration. Pulse good, however, and forget to breathe for some moments. Acts more or less irrational and apparently purposeless and more or less reflex in nature. An insignificant detail of my watch lying before me excites my keen interest. The special senses are fully normal and even somewhat stimulated. The feeling of exaltation and of grandeur continues. Gait somewhat irregular but no definite sign of muscular incoördination. Thinking difficult. The second self appears to be in control directing my every effort. Mouth dry.

10:50 P.M.—Pulse 74, full and strong. Memory fails completely, though fully conscious of the environment. I am capable of anything and everything. No task would be too great, no problem too difficult. The exalted feeling is much increased and wholly indescribable and appears to be general and all-inclusive. Thoughts of Kant's "Ich und das Nicht-Ich" flash through my mind. I realize that I have lost control of myself but am wholly unable to fight off the feeling.

From 10:55 P.M. to about 2:30 A.M. it was impossible to continue the record. The idea of duality continues. I watch myself lay away the unfinished record of the test, make the usual preparations for bed, undress, get into bed, doing everything in my wonted manner and at all times fully comprehending every act. Sleep is impossible. To describe the sensations which continue for some three hours is impossible. They are very imperfectly and incompletely tabulated as follows, from memory.

1. The feeling of supreme exaltation and of grandeur continues in varying degrees.

2. The idea of oneness with all nature and with the entire universe seems to take hold. There is no material body or personality.

3. I point out to myself objects in my room, as clothing on a chair, the door to my room, the window through which the light from street lamps shines, to convince myself of my own existence. I look at myself lying in bed and feel reassured. I apply the following test. I hold my right hand before my face and say, "I recognize this as my hand, it belongs to me, and hence I am I." This argument amuses me considerably. I wonder if this may be the end but there is absolutely no feeling of worry or of anxiety about it. The skin is now moist but the mouth continues dry.

4. I have momentary but imperfect visions or glimpses of vast beautiful landscapes, showing wonderful color effects. The landscape features are not clearly outlined. There appear to be rolling hills and valleys with wonderful coloring, recalling vaguely California landscapes. I do not visualize persons nor do persons play any part in the mental imagery. I touch myself here and there to convince myself of my existence. Tactile sense apparently normal.

5. There is a marvelous color imagery, blues, purples and old gold predominating, with most delicate shading effects. The most beautiful designs and patterns (curved lines) appear in space, all with wonderful coloring. Beautiful gardens filled with flowers appear. Again grotesque monsters appear of ever-varying forms and without producing any terrifying effects.

6. The mind flits about everywhere. It is wholly impossible to fix the attention.

7. I hold lively arguments with myself on all imaginable subjects. I try to solve important problems, as universal gravitation, the cancer problem, tuberculosis, the European muddle, the financial crisis, etc., but in each instance I fail to arrive at any conclusions.

8. Humorous incidents flash through my mind and I snigger to myself. The all-satisfying and supremely comforting feeling continues in varying degrees of intensity.

9. Impulses to indulge in rhythmic motion of hands, of feet, of the entire body, seize upon me. There is the impulse to whistle, to sing, to hum tunes. Doing these things entails no conscious effort on my part. Apparently no actual sounds are made.

10. I wonder what the end will be? Will I come out of it alive? I continue from time to time the tests to satisfy myself of my own existence. The thought comes to me from time to time that the experiences are not real, that I am bluffing, that I only imagine the experiences but at the very next moment I am compelled to admit that it is all real.

11. The idea that a drug which can produce a feeling of such extreme happiness and well-being can do no harm and that it would be proper to take such a drug as a stimulant, passes through my mind several times. I regret that others cannot share with me this feeling of well-being. Skin is moist but mouth continues dry.

12. I indulge in random chatter (evidently in a whisper or possibly in lip movement only) on all sorts of topics, but never completing a sentence, for the mind is constantly presenting new subjects and the speech centers cannot keep up the pace.

13. I wonder whether I am awake or asleep and try to find reasons for and against the idea but I am unable to convince myself as to the state I am in. Pulse full and regular and probably not over 62. Respiration apparently normal.

14. Evidently sleep gradually set in and continued undisturbed until the usual rising time, about 6 o'clock A.M. No special sensation on rising. Feeling, if anything, more than usually refreshed. All of the sensations above recorded have completely vanished. The recollections of the experiences are however very clear and vivid. Mouth continued dry until the morning. No after-effects of any kind. The action of the kidneys is increased but no effects as to the intestinal tract. Skin normal and heart action and respiration entirely normal.

Three adult members of the household were informed that a drug test was to be made. No one was present with the experimenter during the entire time of the drug action. None of the three persons noted the slightest disturbance in the writer's room, no walking about, no talking, no laughing or singing. The experimenter has at all times, during his entire life, exercised considerable self-control which no doubt had important bearing on the fact that there were no physical expressions to the mental impulses above recorded. The writer was fully aware of

the fact that there were others in the building who might be disturbed by unusual physical expressions. The following may be given as a summary of the effects produced by a single large dose of a fresh fluidextract of *Cannabis indica*.

1. Mental depression. Worry, apprehension, death fear. Slight reduction in heart action. Somewhat irregular respiration.

2. Slight increase in heart rate. Pulse becomes fuller and stronger.

3. Subconscious or dual nature state. Extreme mental exaltation. Apparently the natural inclinations and desires hold sway and are apparently under the control of the second self, but it is the first or the original self which prevents the performance of acts which are under the domination of the second self. Apparently the two selves cannot act independently, one acting as a check upon the other.

4. Kalaidescopic sequence of events. Color imagery. Remarkable landscape imagery. Persons are not visualized in any way whatsoever.

5. Extreme happiness. All sense of fatigue is annihilated. Physical acts entail no appreciable exertion or effort.

6. Normal, apparently dreamless sleep with normal awakening.

7. No after-effects of any kind.

8. Diuretic action marked.

The period of mental depression is brief. The period of exaltation up to the time of normal sleep induction endured for about five hours, perhaps a little longer. Being personally convinced of the ability to control all impulses due to Cannabis action it was decided to try the second test in public, as follows.

SECOND TEST.

(LINCOLN, NEBRASKA. FROM 10:00 A.M. OF MAY 8 TO 6:00 A.M. OF MAY 9, 1921.)

10:00 A.M.—Took one drachm of fluidextract of Cannabis. The preparation was only slightly green and not very bitter. Wholly inert. No effects of any kind, excepting the diuretic action, followed. This would seem to indicate that the diuretic action of the drug is quite distinct from the mental effects and that it does not readily deteriorate.

1:05 P.M.—Took one drachm of Mulford fluidextract of Cannabis. This had a dark green color, was very bitter and resinous and was thought to be active. One hour after only a slight reaction was observable, indicated by a slight increase in pulse rate and mere suggestions of mental disturbance. Diuretic effects marked.

2:05 P.M.—Took $^1/_2$ drachm of fluidextract of Cannabis labeled "College of Pharmacy," which was also very bitter and markedly dark green and had the characteristic odor of Cannabis. Within one hour distinct effects were developed which may be described as follows.

1. Far-away dreamy condition of mind. Repeated spells of temporary amnesia. These spells probably did not endure for more than a second or two and the awakening was in each instance explosively abrupt. Street noises are unusually distinct. Vision very clear. After arranging certain laboratory experiments I decide to take a walk.

2. I walk for several blocks meeting many people. Nothing worthy of mention occurs. I attempt to measure the time of the memory lapses, from the time of onset to recovery, by the distance any one may have walked during a spell, and decided that they endure for five or six seconds and I also arrive at the conclusion that these spells do not in the least affect my acts, such as walking, opening a door to a public building, talking to a person, etc.

3. A heavy thunder storm is coming on and I enter the lobby of a hotel. I feel drowsy and sit down in a chair. The lobby is fairly filled with men who are engaged in the usual hotel lobby conversation. The memory lapses continue. A man sits down beside me commenting upon the thunder storm to which I reply in my usual manner. The voices appear distant though distinct. I note that with great regularity, the first thought that comes to me after one of the memory lapses, is that the very first remark which I hear has reference to my mental condition, it making no difference whatsoever what the remark may or might be, such as "That is certainly the limit," "He is certainly off," "I doubt it very much," "That was a good one certainly," etc., etc. If

silence prevailed immediately upon recovery from such a lapse, that was construed as a silence due to horror at my condition. I casually look about me to make sure that I am not being observed. There is not the faintest indication that anyone present has observed anything unusual in my condition. The drowsy feeling continues.

4. I enter the dining room of the hotel. Read the menu card and order my dinner in the usual manner, the waitress taking no notice of me. I eat my meal entirely in the usual manner. The storm continues. During one of my memory lapses I overhear one of the waitresses remark, "Isn't it awful," and immediately construe this to apply to my mental condition until I realize that the remark was occasioned by an unusually heavy clap of thunder which also brought me out of the memory lapse. The waitress approaches to ask what else I might wish to eat, and she is reminded that she had not as yet brought on my dessert. At no time during the entire test was there a feeling of exaltation and of grandeur as during the first test. There was some color imagery but even that was not marked. The drowsy far-away feeling continues.

5. I sit in the office of the hotel for a while, feel drowsy, go to my room and to bed about 6:30 P.M. and drop off to sleep within an hour. Sleep apparently undisturbed and did not awake until about 6 A.M., feeling a little better than usual. As is usual with me, my mind at once occupies itself with the work that awaits me, as the cancer research, certain drug investigations, the college work, the summer school work, etc. I again drop off to sleep for perhaps one-half hour, get up and proceed to my usual work, no evidence of drug action remaining. Diuretic action marked.

The test may be summarized as follows:

1. At no time was there any distinct mental exaltation or feeling of grandeur.
2. The dual nature idea was not as marked as it was during the first test.
3. The far-away dreamy state was the most marked feature of this test, and endured for fully five hours from the time of the onset of the Cannabis action. The peculiar memory lapses have already been described, which were a marked feature in the test.
4. Color and form (patterns, designs, monsters, etc.) imagery were poorly developed as compared with the first test.
5. The diuretic action continued throughout the drug action.

THIRD TEST.

(LINCOLN, NEBRASKA. JANUARY 8, 1922.)

At 8:50 P.M. took about 3 cc of the Lathrop pharmacy fluidextract of *Cannabis indica* under conditions apparently similar to those of test one. The drug action may be summarized as follows:

1. No special preliminary symptoms; no special feeling of worry or of apprehension. Heart action increased from 63 (normal) to 78, pulse being at times weak and thready and again weak and soft.
2. At no time was there any feeling of exaltation or of grandeur.
3. The feeling of remoteness was pronounced, but the dual nature idea did not develop.
4. Did not feel especially at ease or comfortable at any time during the entire drug action.
5. Color imagery quite marked. Vast landscapes and extensive fields of flowers appear. Indistinct forms develop which later change into the most grotesque ever-changing figures of indescribable beings. At no times are human beings distinctly visualized.
6. After a time, several hours after the beginning of the drug action, I retire and apparently drop off to sleep. Awaken less refreshed than on the occasion of the other tests. Slight feeling of nausea. Mouth dry. Diuretic action marked.

FOURTH TEST.

(LINCOLN, NEBRASKA. FEB. 12, 1922.)

At 8 P: M. took about 8 cc of the Lathrop pharmacy fluidextract of *Cannibis indica* (now about one year old), washing it down with liberal quantities of water. No appreciable effects for about $1^1/_2$ hours, when suddenly the sensation of being asleep developed, and I had some difficulty in deciding as to the state I was in, sleeping or waking. Thinking that the Cannabis action might be more pronounced in the dark, more especially as to color imagery, I went to bed turning out the light. The idea of a dual nature developed, but to a less marked degree than on previous occasions. There was considerable color imagery but even that was less than on previous occasions. At no time during the entire test was there any distinct feeling of elation, exaltation or of mental grandeur.

About one hour after the onset of the Cannabis action, I rather suddenly lose my subjective identity completely and my "astral" body appears to be making trips to various parts of the earth and to remote parts of the universe. In a hazy sort of way I am reminded of Mark Twain's "Captain Stormfield's Trip to Heaven." That which I visit and visualize is quite indescribable. There are vast cities of oriental aspect, and landscapes of forest-covered plains, hills and mountains, all wonderfully colored. Nowhere do people appear. Indescribable animal monsters flit here and there but without creating the least sensation of fear. No sooner does one shape appear when it begins to melt into another form or to disappear completely. The dread thought seizes upon me that I am getting so far away that it will be impossible for me to get back to earth. I try to get back but am constantly carried on against my will into new portions of the universe. Quite suddenly, after a monster effort, I come back to earth, back to my room in the hotel, back to bed. I am greatly relieved and say to myself, "It is good to be back."

More color imagery develops, landscapes appear to vanish as quickly. I see mountain ranges in the distance with marvelous shadows and colors (mostly deep, dull purplish blues). I try to test my mind and as on other occasions I seek the solutions to various problems but without the least satisfaction, it being impossible to keep the mind on one subject for any length of time. I quote simple statements and word-analyze each statement with apparently remarkable results. That is, I find that each word in the sentence has a special significance and could not possibly have been replaced by any other word. I also note striking double meanings of the words. (Have given considerable attention to psychoanalysis recently.)

Rather suddenly all is changed. Probably for a period of not less than six hours I suffer from nightmare. I am convinced that the end has arrived and that I cannot recover. I try to shake off this feeling and I succeed momentarily by fixing my gaze on some bright object, as the markings on my bed quilt, one of the silver cuff buttons in my shirt which is hanging on a chair near the bed, the light which shines through the open window, the trunk in the corner of the room. I can also shake off the feeling momentarily by raising myself on my elbow. After a time I fail even in these attempts and I admit to myself that I am no longer in existence, as far as ordinary life is concerned, yet I appear to be fully conscious of all that transpires. Dizziness and nausea develop. I realize that the nausea cannot be controlled. I get up and make use of the waste water jar. After the vomiting I feel slightly relieved. I get a towel, get back to bed. All is done in what appears to be a dream state and I am convinced that I was in a dream or somnambulistic state. I had three attacks of vomiting and each time I appear to be asleep or dreaming After the third attack of vomiting I feel less disturbed, less alarmed and in time I apparently dropped off to sleep, possibly about 3 A.M., and did not awaken until about 6:30 A.M. On awakening I felt anything but refreshed, some nausea continuing. Diuretic action marked as on previous occasions. A severe attack of the grippe followed this final test about 24 hours after, which lasted for fully three weeks.

SUMMARIZING AND CONCLUDING STATEMENTS.

1. The effects of large doses of Cannabis are extremely variable even in one and the same person.

2. Cannabis has marked diuretic action which endures for twelve to fourteen hours after the drug is taken. Apparently the diuretic action is independent of the mental effects. Cannabis preparations which have almost completely lost all mental effects still retain full diuretic action. The intestinal tract is not affected. Appetite is somewhat improved.

3. Since Cannabis is a drug of such variable and unreliable action it should be taken from the U. S. P. As a hypnotic it is inferior to many others. It does not lessen the sense of pain to any appreciable degree. Mentally it tends toward listlessness, lessening the power to concentrate, and gives rise to amnesia and forgetfulness. It does not stimulate the higher faculties nor does it paralyze them.

4. Cannabis action should prove of great interest to students of psychology, of psychiatry and of psychoanalysis.

5. Cannabis has a profound effect upon the imaginative faculties. The lower or animal faculties are apparently neither stimulated nor dulled or paralyzed. There is nothing in the tests herein recorded which would throw light on the cases of homicidal mania observed in Hindoo addicts. One of the constant manifestations of Cannabis action is the idea that the sensations are not real, that they are a "bluff," but invariably the reality of the sensations is admitted.

6. The following statements are offered as to the sex emotions due to Cannabis. Wood in his single test has this to say—"At no time was there any aphrodisiac effect produced." On the other hand nearly all commentators on Cannabis action refer to the sex imagery as described by the Hindoo addicts to this drug. The writer's own experience with the drug would indicate that there is a distinct and unmistakable sex tinge to its action, more especially in the association with the effects of exaltation and emotions of grandeur. The subjective nature of the sex imagery is unmistakable, but it is never objectively materialistic. The sex imagery is very difficult to describe and is most apparent during the first half of the period of drug action.

7. The specific effects of Cannabis have been set forth in the text and are not summarized.

THE UNIVERSITY OF NEBRASKA,
COLLEGE OF PHARMACY,
LINCOLN, NEBRASKA, MARCH 13, 1922.

TOXICITY OF NEOARSPHENAMINE. II.*

BY FREDERICK W. HEYL, MERRILL C. HART AND WILBUR B. PAYNE.

In the course of some work on mixed arseno derivatives, which will be reported later, we have prepared condensation products in which the amino groups in both benzene rings were substituted. We have been interested in comparing the toxicities of these preparations with neoarsphenamine.

As we have previously shown[1] such a comparison can only be made by eliminating the error introduced through the variations in the test rats. We therefore prepared fresh solutions of neoarsphenamine on a number of occasions, and were surprised to find the tolerance much higher than we had previously reported. Instead of 320 mg./Kg., maximum tolerated doses of 440 mg./Kg. were almost always withstood, due simply to variation in the rats.

During this work 3-amino-4-hydroxyphenylarsinic acid has been used as starting material, and the reduction yielding mixed arseno compounds have been made with sodium hydrosulphite of high purity. We have incidentally determined the influence of these apparent improvements upon the toxicity of the resultant neoarsphenamine. It amounts to 40–60 mg./Kg. in the tolerance test. The rats used were uniformly from one strain.

In a series of papers[2] Christiansen has shown that where the synthesis of arsphenamine is carried out, using 3-amino-4-hydroxyphenylarsinic acid, instead of

* Received January 14, 1923.

[1] Hart and Payne, *J. Am. Chem. Soc.*, 44, 1150, 1922.

[2] *J. Am. Chem. Soc.*, 42, 2402, 1920; 43, 370 and 2202, 1921.

the corresponding nitro derivative, with which all our previous work had been done, there is a conspicuous decrease in the toxicity of the resultant product. This method in fact gives material which is frequently tolerated in doses of 160 mg./Kg., and thus shows a conspicuous improvement over the average samples prepared from the nitro body. It was thought that the greater purity and lower toxicity of this arsphenamine might have a favorable influence on the toxicity of the neoarsphenamine prepared from it. We have shown in a previous paper[1] that the toxicity of the arsphenamine from 90 to 130 mg./Kg. from "nitro acid" has no appreciable effect on the neoarsphenamine prepared from it. Our results in this case also show that even arsphenamine of a toxicity of 160 mg./Kg. from pure "amino acid" has no measurable effect on the toxicity of the neoarsphenamine derived from it.

Voegtlin and Miller[2] recently reported the lethal dose of this drug as varying from 360–520 mg./Kg. and concluded that the product is now considerably less toxic than heretofore, because of improved methods of production. This conclusion is not justified unless the rat variation is taken into consideration. The early usefulness of this test in detecting accidental variation due to oxidation remains of practical value, but the refinements of production have no doubt been carried to the point where the test animals may vary more than the perfected drug itself.

Dale and White[3] go so far as to practically discard this test and do not calculate therapeutic efficiency.[4] Instead they are inclined to a new laboratory test in which the effectiveness in parasiticidal action on infected mice is demonstrated. On rats the effective dose is shown to vary from 8.5 to 28.1 mg./Kg. and these maximum and minimum values were found for samples having the same toxicity (480 mg./Kg.). Obviously the toxicity and efficiency do not vary simultaneously. However, even this range of effectiveness does not appear to establish the limits, for in an earlier paper[5] a sample is shown to have a maximum lethal does of 560 mg./Kg. and a minimum effective does of 3.75 mg./Kg. This pharmacological test would therefore incline one to accept the idea that one sample of neoarsphenamine might be 7.5 times as efficient as another.

From the chemical point of view it is practically impossible to attach to this conclusion the importance which it appears to have pharmacologically. When a sample of neoarsphenamine is prepared starting from the pure 3-amino-4-hydroxyphenylarsinic acid so that the side reactions resulting from the interaction of sodium bisulphite on nitro derivatives[6] are excluded, and when toxicity and composition are found practically constant, there appears to be no chemical basis for these findings, so far as the drug is concerned. Whether further pharmacological work will prove helpful to clinicians is questionable. It appears doubtful to us whether further pharmacological control can replace or assist the essential clinical work of the trained syphilographer.

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[1] Hart and Payne, *Loc. cit.*

[2] "Public Health Reports," 37, No. 27, 1632, 1922.

[3] *The Lancet*, CCII, 779, 1922.

[4] The minimum lethal dose in mg./Kg. divided by the minimum dose which is effective in killing all the parasites in an experimentally infected rat in 24 hours.

[5] Voegtlin, Dyer & Miller, *J. Pharmacolog.*, XX, 148, 1922.

[6] Weil and Moser, Ber., 55, 732, 1922.

EXPERIMENTAL.

1. *Arsphenamine.*—The material used in the following experiments was prepared by the Ehrlich process, using highly purified crystalline 3-amino-4-hydroxyphenylarsinic acid to replace the corresponding nitro acid. The hydrosulphite had a purity of approximately 95% and was prepared by the method previously described[1] except that the filtration and desiccation were carried out in the specially designed apparatus in which these operations are conducted in an inert atmosphere on one operation.[2] The special usefulness of this apparatus is demonstrated in the preparation of hydrosulphite. We used 3.6 times the calculated quantity, thus decreasing the amount of this reagent by about 50%.

The resultant arsphenamine is correspondingly freer from sulphur, containing not more than 0.25% and is considerably less toxic. The M. T. D. varies from 140 mg./Kg. to 170 mg./Kg. The product which is chemically purer than that derived from the nitro body gives considerably more difficulty in the subsequent condensation due to peculiar colloidal properties exhibited.

When the nitro acid was converted into arsphenamine hydrochloride using the purer hydrosulphite no decrease in toxicity was observed. This averaged about 110 mg./Kg. The substance tended to a high sulphur content (S = 1.9%) but dissolved more readily than that prepared from the amino acid.

Typical samples were used in the following experiments.

All toxicity determinations were made by the official method of the Hygienic Laboratory on white albino rats. The same rats used in all the subsequent experiments did not have a higher resistance to arsphenamine, but toward neoarsphenamine they showed a greatly increased tolerance. For example, using the same stock of rats, a sample of arsphenamine prepared from "amino acid" showed a tolerance equivalent to 160 mg./Kg. They tolerated arsphenamine from nitro acid at only 110 mg./Kg. and then tolerated neoarsphenamine at doses of 440 mg./Kg. We thus satisfied ourselves that the arsphenamine from amino acid was actually less toxic than that from the nitro acid. Upon now using a different stock of rats we obtained results of 160, 110 and 320 mg./Kg., respectively. These values especially emphasize the cause of variability in toxicity of neoarsphenamine, and demonstrate uniformity of the action of arsphenamine.

It is further remarkable that arsphenamine which is tolerated at 160 mg./Kg. gives a neo-derivative which is not significantly less toxic than the derivative prepared from samples of arsphenamine which are much more toxic. There are other factors which have a much greater significance, and these appear to be related, not to slight differences in structural configuration but to physical differences.

2. *Neoarsphenamine from Arsphenamine Prepared from the Pure 3-Amino-4-hydroxyphenylarsinic Acid.*—(*a*) 2.8659 Gm. arsphenamine hydrochloride (As = 29.3%) for which the M. T. D. was 160 mg./Kg. were dissolved in 15 cc absolute methyl alcohol. This material presents exceedingly colloidal properties and dissolves with difficulty. There was some question as to the completeness of solution. The reaction was carried out exactly as described[3] in the previous paper, using

[1] Heyl and Greer, *Am. J. Pharm.*, 94, 80, 1922.

[2] Heyl and Miller, JOUR. A. PH. A., 11, 432, 1922.

[3] *Loc. cit.*

1.95 cc formaldehyde sulphoxylate solution (100%). Time, 18 minutes. Temperature, 25–26°. The methyl alcohol was removed at 15 mm. pressure. For toxicity of this neoarsphenamine see Table I (*a*). It will be observed that the results indicate a greater tolerance than previously reported, but that the results are irregular. (*b*) It was considered that this irregularity was due to colloidal properties of the arsphenamine hydrochloride, for not only was the solution obtained unsatisfactory, but the reaction was delayed and possibly not quite completed. For this experiment we used arsphenamine hydrochloride (31.15% As) having M. T. D. of 140 mg./Kg. The alcoholic solution presented even poorer properties than (*a*). It was centrifuged clear, and the neoarsphenamine solution prepared as before. Time, 20 minutes. Temperature, 27°. This product gave more regular results, and was less toxic. See Table I (*b*). (*c*) Experiment (*b*) was repeated, omitting the centrifugation. See Table I (*c*).

3. *Neoarsphenamine from Arsphenamine Prepared from 3-Nitro-4-hydroxyphenylarsinic Acid.*—(*d*) From the results obtained in the above experiments it is established that the maximum tolerated dose of neoarsphenamine might appear to be much higher than previously reported (320 mg./Kg.). This might be presumed to be due to the use of pure 3-amino-4-hydroxyphenylarsinic acid. Other possibilities present themselves however. The rats used might be more resistant. The use of purer hydrosulphite might be an influence. The experiment (*b*) was repeated using arsphenamine hydrochloride which had been prepared from nitro acid by the use of 95% hydrosulphite. (Analysis showed As = 31.1; S = 1.9%; M. L. D. = 110 mg./Kg.) The result is astonishingly high. See Table I (*d*). The same experiment, using the same arsphenamine and omitting centrifugation, gave results in (*e*).

(4). *Determination of the Resistance of the Test Animals.*—For this purpose we started with a sample of arsphenamine hydrochloride M used in our previous work and which had been prepared using cruder hydrosulphite. The methyl alcoholic solution was centrifuged. Time, 20 minutes. Temperature, 26°. The results of the rat test are found below (Table I (*f*)).

TABLE I.

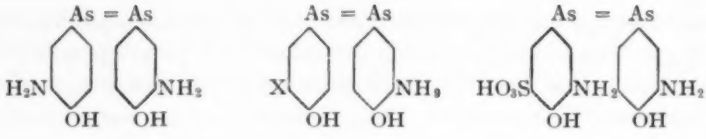
Expt. No.	As %.	Doses: mg./Kg. 360.	400.	440.	480.	520.
2 *a*	20.2	+++−−	++−−−	+++−−		
b	19.0			++++−	+++−−	+++−−
c	19.65	10 L.; 0 D.	+++++			−−−−−
3 *d*	20.0	10 L.; 0 D.	+++++			
	20.25			++++−	+++++	+−−−−
e	20.0		++++−	+++−−	++−−−	
4 *f*	18.0	+++++	+++++	++++−	+++++	+−−−−

\+ Lived. − Died.

These results are readily interpreted and the relative importance of various factors which yield high test material may be estimated. The most significant factor is the variation in the resistance of the rats. This amounts to 120 mg./Kg.; the same sample to which previously a tolerance of 320 mg./Kg. could be established is now survived at doses of 440 mg./Kg. (at 20% As). We attribute a decrease in toxicity to the use of purer hydrosulphite of not more than 40 mg./Kg. The

value of the use of amino acid is exceedingly questionable, the centrifugation being more important.

5. *Sulphur Content of Neoarsphenamine.*—The neo-derivative which was prepared from amino acid might be expected to show some differences in composition. If we accept Christiansen's hypothesis there will be less of the mixed arseno derivative II, or perhaps of III, since the pure product I is derived from the pure amino acid.



I. II. III.

As a matter of fact the derived neoarsphenamines show very slight variation due to this factor, since arsphenamine derived from the nitro acid, and containing almost 2% of sulphur, gave a neoarsphenamine which was withstood in approximately the same doses as that prepared through arsphenamine (0.25% S) from the amino acid. The analyses for sulphur distribution, carried out as previously described,[1] gave the following results, reported as atomic ratios. Theory for a mono-substituted neoarsphenamine requires 2 arsenic: 1 sulphur.

TABLE II.—DISTRIBUTION OF SULPHUR IN NEOARSPHENAMINE.

Expt.	Arsphenamine.	Source.	Procedure.	Total S.	"Neo" S.	Nuclear S.
2 *a*	52	"Amino acid"	95% $Na_2S_2O_4$	1.33	1.24	0.09
*b**	69	"Amino acid"	95% $Na_2S_2O_4$	1.39	1.27	0.12
c	69	"Amino acid"	95% $Na_2S_2O_4$	....	....	....
3 *d**	181	Nitro acid	80% $Na_2S_2O_4$	1.32	1.16	0.16
	181	Nitro acid	80% $Na_2S_2O_4$	1.40	1.26	0.14
	65	Nitro acid	95% $Na_2S_2O_4$	1.37	1.00	0.37
e	65	Nitro acid	95% $Na_2S_2O_4$	1.35	1.10	0.25
4 *f**	M	Nitro acid	80% $Na_2S_2O_4$	1.49	1.27	0.22

* Centrifuged.

Arsphenamine 52 and 60 contained 0.25% S (0.04 atomic ratio).

No. 65 contained 1.9% S (0.29 atomic ratio), No. 181 contained 1.0% S.

It is evident that the variations in the sulphur distribution vary to such an extent that any alteration due to the use of the amino acid cannot be detected.

SUMMARY.

1. The decrease in toxicity of neoarsphenamine that results from the use of 3-amino-4-hydroxyphenylarsinic acid is slight.

2. Similar slight improvement results from purified hydrosulphite.

3. The variability of different test rats toward the same neoarsphenamine is shown to have large dimensions. On the other hand test rats do not exhibit this behavior toward arsphenamine.

4. The maximum toxicity of neoarsphenamine was found to be 480 to 500 mg./Kg.

5. Taking the variability of the test animals into consideration, the value 360–380 mg./Kg. would have resulted had rats been used of the same resistance as those previously reported.

[1] *Loc. cit.*

6. Since the previous work gave M. T. D. = 320 mg./Kg. it has been shown that the maximum decrease of toxicity due to amino acid, pure hydrosulphite and centrifugation is 40–60 mg./Kg.

CONTRIBUTION FROM THE
LABORATORIES OF THE
UPJOHN COMPANY,
KALAMAZOO, MICHIGAN.

MISCELLANEOUS CHEMICAL PAPERS.*

4. Fractionation of Turpentine Oil.[1]

BY W. F. SUDRO.

A quantity of approximately five gallons of turpentine was steam-distilled, the distillate being received in approximately liter fractions, sixteen in number. The distillates were immediately placed into bottles filled to the stopper in order to prevent oxidation or other changes. The data on the steam-distillation are given in Table I.

TABLE I.

Steam distillation fraction.	Sp. gr. 20° C. (Westphal).	Refractive index 20° C.	Polarization 23° C.
1	0.862	1.4660	+15.25
2	0.863	1.4675	+14.85
3	0.863	1.4671	+15.1
4	0.864	1.4682	+14.7
5	0.863	1.4680	+14.6
6	0.863	1.4682	+14.5
7	0.864	1.4661	+14.1
8	0.863	1.4668	+13.9
9	0.863	1.4670	+13.8
10	0.864	1.4685	+13.3
11	0.864	1.4684	+13.1
12	0.864	1.4687	+12.4
13	0.865	1.4690	+11.7
14	0.865	1.4690	+10.5
15	0.868	1.4698	+ 9.4
16	0.870	1.4708	+ 7.4

Upon inspection of the table it will be observed that the specific gravity gradually increases from the first fraction to the last, the constants running as one would expect. The polarization constants are also in strict agreement, the angle of rotation gradually diminishing with an increase in the number of the fractions, the only exception noted being either with fraction number two or three.

The indices of refraction show a relative increase with the exception of Fractions 7, 8 and 9. This will be discussed later.

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* From the Laboratory of Edward Kremers. Read before Scientific Section, A. Ph. A., Cleveland meeting, 1922.

[1] Part of thesis submitted for the degree of Master of Science at the University of Wisconsin, 1919.

The fractionation here recorded was carred out by Mr. Sudro for the purpose of gaining a better insight into the boiling temperature conditions of a so-called hydrocarbon oil. The results of a carefully performed series of steam and direct distillations of a commercial American turpentine oil may prove of interest to others, hence should be worth recording. The immediate incentive to perform such a "tedious" task was to obtain as pure a pinene fraction as obtainable by this means for chemical experiments that will be reported in another paper.—E. K.

TABLE II.

Steam distillation fraction.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Fraction boiling below 155°																
Percentage of yield...	8.3	2.2	5.0	1.2	1.4	1.8	2.0	2.6	1.6	1.5	2.1	1.0	Negligible amounts distilled			
Specific gravity at 20°	0.861	...	0.859	...	...	...	...	...	...	...	...	...	...	...	...	...
Refractive index at 20°.....	1.4654	1 4648	1.4646	1.4665	1.4663	1.4670	1.4659	1.4659	1.4667	1.4671	1.4670	1.4671	...	...	...	...
Fraction boiling at 155 to 156°																
Percentage of yield...	31.0	28.9	21.7	11.7	8.8	11.5	6.2	6.2	7.6	3.9	2.5	1.6	1.0	Negligible amounts		
Specific gravity at 20°.....	0.861	0.861	0.859	0.862	0.861	0.861	0.861	0.861	0.861	0.862	...	...	...	...	...	...
Refractive index at 20°.....	1.4661	1.4660	1.4659	1.4675	1.4667	1.4671	1.4663	1.4669	1.4672	1.4673	1.4674	1.4671	1.4671	....	...	...
Fraction boiling at 156 to 157°																
Percentage of yield...	41.8	36.6	47.9	25.7	28.7	35.5	37.6	27.7	20.8	21.1	20.8	15.5	4.7	4.5	2.6	1.0
Specific gravity at 20°.....	0.861	0.862	0.860	0.863	0.861	0.861	0.861	0.861	0.862	0.862	0.861	0.861	0.862	0.862	...	...
Refractive index at 20°.....	1.4668	1.4670	1.4670	1.4678	1.4673	1.4674	1.4668	1.4671	1.4675	1.4676	1.4676	1.4677	1.4674	1.4676	1.4680	1.4688
Fraction boiling at 157 to 158°																
Percentage of yield...	9.0	17.0	14.8	36.7	35.8	30.6	32.2	37.3	37.5	40.1	36.9	35.6	24.5	15.2	9.9	1.0
Specific gravity at 20°.....	0.862	0.863	0.861	0.863	0.862	0.862	0.862	0.862	0.862	0.862	0.862	0.863	0.863	0.863	0.863	...
Refractive index at 20°.....	1.4678	1.4678	1.4678	1.4680	1.4677	1.4679	1.4677	1.4677	1.4679	1.4680	1.4680	1.4681	1.4680	1.4680	1.4685	1.4690
Fraction boiling at 158 to 160°																
Percentage of yield...	7.2	11.1	6.8	20.6	19.4	16.6	16.9	19.0	25.2	30.4	33.2	33.6	48.1	52.5	49.6	15.6
Specific gravity at 20°.....	0.864	0.864	0.864	0.864	0.862	0.864	0.864	0.864	0.864	0.864	0.863	0.864	0.863	0.864	0.864	0.867
Refractive index at 20°.....	1.4687	1.4687	1.4687	1.4690	1.4689	1.4690	1.4685	1.4682	1.4685	1.4689	1.4689	1.4686	1.4682	1.4683	1.4687	1.4698
Fraction boiling above 160°																
Percentage of yield...	2.9	4.4	3.9	4.1	6.0	4.2	5.1	7.3	7.4	3.0	4.5	12.8	21.7	27.8	37.9	82.4
Specific gravity at 20°.....	...	...	...	0.880	0.873	0.879	0.876	0.876	0.874	0.877	0.878	0.874	0.871	0.868	0.868	0.873
Refractive index at 20°.....	1.4753	1.4740	1.4765	1.4750	1.4725	1.4742	1.4728	1.4721	1.4723	1.4731	1.4737	1.4719	1.4710	1.4710	1.4716	1.4720

The next step was to distil each of the sixteen steam-distillation fractions over direct flame, fractions being obtained at the following boiling points: up to 155° C., 155 to 156°, 156 to 157°, 157 to 158°, 158 to 160°, and the residue distilling above 160°. The specific gravity and refractive index for each of the separate fractions were obtained. These, together with the percentage of yield, are tabulated in Table II.

The percentage of yield indicates the per cent. by volume of the steam-distillation fractions which distilled at the given temperature. The results obtained are as expected in that the first steam-distillation fractions are richer in the lower than in the higher boiling-point fractions, while those steam-distillation fractions towards the last are richer in the higher than in the lower boiling-point fractions.

A mean is attained, however, with boiling-point fraction 157–158° where it will be noticed that the per cent. of that fraction gradually increases, then remains fairly constant, and finally decreases as the last steam-distillation fractions are reached.

The average specific gravity, the minimum and maximum values for the same, together with the difference between minimum and maximum, are included in Table III.

TABLE III.

Steam distillation fractions.	Average specific gravity.	Minimum specific gravity.	Maximum specific gravity.	Difference between minimum and maximum values.
1	0.862	0.861	0.864	0.003
2	0.863	0.861	0.864	0.003
3	0.861	0.859	0.864	0.005
4	0.866	0.862	0.880	0.018
5	0.864	0.861	0.873	0.012
6	0.865	0.861	0.879	0.018
7	0.865	0.861	0.876	0.015
8	0.865	0.861	0.876	0.015
9	0.865	0.861	0.874	0.013
10	0.865	0.862	0.877	0.015
11	0.866	0.861	0.878	0.017
12	0.865	0.861	0.874	0.013
13	0.865	0.862	0.871	0.009
14	0.864	0.862	0.868	0.006
15	0.865	0.863	0.868	0.005
16	0.870	0.867	0.873	0.006

The same values with reference to the refractive index are given in Table IV.

With reference to Table IV, attention is called to the fact that the average values for the indices of refraction for the steam-distillation Fractions 7, 8 and 9, agree very closely with the constants for the neighboring fractions. This proves beyond a doubt that the variable values given in Table I for these fractions are to be accounted for by the fact that some disturbing factor must have been introduced. In other words, the abnormality was not due to the constituency of the turpentine itself.

Table V includes tabulated data with reference to the specific gravity and refractive index for each of the six boiling-point fractions. The values for the average specific gravity and refractive index are in strict accord with the results which would be expected.

TABLE IV.

Steam distillation fractions.	Average refractive index.	Minimum refractive index.	Maximum refractive index.	Difference between minimum and maximum values.
1	1.4690	1.4654	1.4753	0.0099
2	1.4681	1.4648	1.4740	0.0092
3	1.4684	1.4646	1.4765	0.0119
4	1.4690	1.4665	1.4750	0.0085
5	1.4687	1.4663	1.4725	0.0062
6	1.4684	1.4670	1.4742	0.0072
7	1.4680	1.4659	1.4728	0.0069
8	1.4680	1.4659	1.4721	0.0062
9	1.4684	1.4667	1.4723	0.0056
10	1.4687	1.4671	1.4731	0.0060
11	1.4688	1.4670	1.4737	0.0060
12	1.4684	1.4671	1.4719	0.0048
13	1.4683	1.4671	1.4710	0.0039
14	1.4687	1.4676	1.4710	0.0039
15	1.4692	1.4680	1.4716	0.0036
16	1.4699	1.4688	1.4720	0.0032

TABLE V.

Boiling-point fractions.	—155°.	155 to 156°.	156 to 157°.	157 to 158°.	158 to 160°.	160°+.
Average sp. gr.	0.860	0.861	0.861	0.862	0.864	0.874
Minimum sp. gr.	0.859	0.859	0.860	0.861	0.862	0.871
Maximum sp. gr.	0.861	0.862	0.863	0.863	0.867	0.880
Diff. betw. min. and max. values.	0.002	0.003	0.003	0.002	0.005	0.009
Average refr. index	1.4662	1.4668	1.4674	1.4680	1.4687	1.4731
Minimum refr. index	1.4646	1.4659	1.4668	1.4677	1.4682	1.4731
Maximum refr. index	1.4671	1.4675	1.4688	1.4690	1.4698	1.4765
Diff. betw. min. and max. values.	0.0025	0.0016	0.0020	0.0013	0.0016	0.0055
Sum total of distillates obt. for given temp	1.93%	8.94%	23.15%	25.99%	25.49%	14.53%

In Table V the sum total of the distillates obtained for the six boiling-point fractions is also given. Less than 10 per cent. of the entire volume of this particular sample of turpentine consisted of pinene, or the fraction boiling at 155 to 156°; three-fourths distilling between 156 and 160°.

In conclusion, the data submitted show the relation between the several fractions, the results being in close agreement with the theoretical valuation. Slight discrepancies are noted but these are of minor consideration.

CONTRIBUTIONS TO THE KNOWLEDGE OF FOREST PRODUCTS.*

IV. ON CYMENE FROM THE OIL OF MONARDA PUNCTATA L.

BY J. M. JOHNSTON, H. MERRITT, AND R. E. KREMERS.[1]

Introduction.—Among the plants whose volatile oil contains thymol is *Monarda punctata* L. It grows on poor sandy soil in nearly all states east of the Mississippi River. In the north at least it is often found associated with open stands of oak or jack pine. Hence this species of *Labiatae* deserves careful attention in connection

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[1] At present Fellow in Biochemistry at the University of Wisconsin for the National Research Council. This incomplete paper is published as it is, because the work at the Vanderbilt Laboratory has been interrupted.

with the utilization of non-agricultural lands for forest purposes. The thymol, for which the oil is now valued, is seldom present to an extent of more than 50 per cent. The original investigation of this oil revealed the fact that cymene was the major constituent of the non-phenol portion.[1] It has since been found that other hydrocarbons are present.[2] With larger quantities of material available, it was thought desirable to attempt the purification of cymene from this source. As is well known the same substance from different sources often requires slightly different methods of isolation and purification. It is hoped that a more complete knowledge of this material may aid in the future production of this oil from forest areas and its subsequent utilization.

Material.—The material used in the following experiments comprised two fractions of non-phenol Monarda punctata oil for which we wish to thank the Director of the Wisconsin Pharmaceutical Experiment Station. The two liters of oil represented as many fractions of oil obtained by Mr. Max Phillips by the steam distillation of a large quantity of oil. The following constants were recorded:

Liter no.	d.	n.	α.
11	0.848	1.478	+6.43°
17	0.865	1.481	+6.31°

Fractionation.—Fifty cc of Liter II were submitted to fractional distillation through a short column.

Fraction.	B. p.	Vol. 1st.	Vol. 2nd.
1	160–65°	5 cc	6 cc
2	165–70	10	13
3	170–75	20	26
4	175–80	15	5

The following constants were recorded after each distillation:

Fraction	1	2	3	4	Cymene
d, 1st	0.798	0.846	0.843	...	0.855
n, 1st	1.472	1.477	1.481	...	...
n, 2nd	1.469	1.476	1.483	1.485	1.4845
α, 1st	+2.94°	+5.37°	+7.90°	...	...
α, 2nd	−2.18°	+4.20°	+8.18°	...	±0.0°

It thus became evident that the cymene fraction tended to become more strongly dextro-rotatory by the removal of a lower boiling levo-rotatory substance. This pointed to the presence of a compound of nearly the same boiling point as cymene. Hence it was decided to try chemical purification.

Purification by Permanganate.—A larger portion of Liter II was fractionated as before. Fifty cc of the 170–75° fraction were then oxidized with 1 per cent. permanganate solution by shaking the liquids together at room temperature. Permanganate was added until its color was permanent. The mixture was then steam-distilled until no more oil came over. The latter was separated, dried over sodium, and distilled. The material boiled between 172° and 175° C.

$$d_{23} = 0.8550;\ n_{23} = 1.4845;\ \alpha = \pm 0.0°$$

The sulphoneamide prepared from this product according to Schorger's[3] method was first thoroughly dried and then melted at 114°.

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[1] Schumann and E. Kremers, *Pharm. Rev.*, 14, 223, 1896.

[2] N. A. Wakeman, *Science*, 51, 397, 1920; *C. A.*, 14, 3643, 1920.

[3] A. W. Schorger, *J. Ind. Eng. Chem.*, 10, 258, 1918.

Encouraged by these results, 100 cc of fraction 170–75° were treated as in the preceding case, except that sodium sulphate was used to dry the recovered oil. The latter was resolved into the following fractions:

Fraction.	B. p.	Weight, Gm.	d_{20}.	n_D.	α.
1	–173°	5.8	..	1.4838	..
2	173–175	35.1	0.853	1.4852	+6.9°
3	175–177	2.5	..	1.4861	..

Because of its optical activity, Fraction 2 was again subjected to the same treatment, but the resulting 25.5 grams of oil possessed identically the same constants as before the second treatment.

Notwithstanding the discrepancy in rotation, this material was treated with chlorsulphonic acid and converted into cymene-sulphonchloride. From the latter, the following compounds were prepared:

N-phenyl Cymene-sulphone-amide.—This compound was prepared by dissolving one mole of cymene sulphone chloride in *n*-heptane and adding two moles of aniline. The reaction took place instantaneously with the formation of a precipitate. This was filtered by suction, washed with water, and twice recrystallized from 50 per cent. alcohol. The melting point was then sharp and constant at 127–28° C.

N-alpha Naphthyl Cymene-sulphone-amide.—This compound was prepared by mixing one mole of cymene sulphone chloride and two moles of alpha-naphthylamine. Solution first took place, followed by reaction as evidenced by evolution of heat and formation of a precipitate. The solid reaction cake was extracted with ether, which removed the new compound. Alpha-naphthylamine hydrochloride remained as a residue; it was identified by its solubilities, crystal form, and melting point. The impure amide left by the evaporation of the ether was purified by two recrystallizations from 95 per cent. alcohol. M. p., 103–4° C.

N-cymyl-2 Cymene-sulphone-amide.—The amino-2 cymene used in this preparation was obtained by Mr. W. A. DeMonbreun from thujone oxime by Semmler's method. The base and the cymene sulphone chloride were brought into reaction in a manner analogous to the Schotten-Baumann technique. The resultant oil crystallized on standing over night and was purified by recrystallization from alcohol. M. p., 117–18° C.

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VOLUMETRIC DETERMINATION OF SODIUM SALICYLATE.

BY M. W. EVANS.

There has been considerable work done on this subject. Messinger and Vortmann originated the method,[1] and different variations have been used up to that used by J. M. Wilkie, given in *J. Soc. Chem. Ind.*, 1911, page 398. He claims many advantages for this modification. The following results, Table 1, were obtained, carrying out his method with the exception that 50 cc water were used instead of 150 cc. Good results were obtained in several cases, while impossible ones in others, with no apparent reason for the divergence of results, except the uncertainty of the end-point.

TABLE 1.

DETERMINATION OF SODIUM SALICYLATE BY METHOD GIVEN BY WILKIE IN *J. Soc. Chem. Ind.*, 1911. p. 398.

Wt. sample.	No. cc. iodine.	*N*/10 factor.	Cc sodium thiosulphate.	*N*/10 factor.	Cc *N*/10 I_2 used up.	Factor for sodium salicylate.	Wt. sod. salicylate calculated.	Per cent. sod. salicylate.
0.04004	30	1.0402	14.88	1.0929	14.95	0.0026674	0.039878	99.59
0.04004	30	1.0402	14.77	1.0929	15.07	0.0026674	0.040198	100.39
0.04004	30.17	1.0402	14.80	1.0929	15.21	0.0026674	0.040571	101.33
0.04004	30	1.0385	14.75	1.0929	15.04	0.0026674	0.040118	100.19
0.04008	30	1.0325	14.57	1.0929	15.06	0.0026674	0.040171	100.23
0.04008	30	1.0325	14.43	1.0929	15.21	0.0026674	0.040571	101.23
0.04008	30	0.9567	12.35	1.0929	15.20	0.0026674	0.040544	101.16
0.04008	32	0.9567	14.10	1.0929	15.20	0.0026674	0.040544	101.16

[1] *J. Soc. Chem. Ind.*, 1900, p. 568.

Mr. Wilkie states that at the end of five minutes' standing, the reaction product is wholly tri-iodophenol. In every experiment above there was a precipitation, and the conversion went, at least partially, to the red quinone before the end of five minutes, in some cases to a greater extent than others, judging by the color. The further the conversion and the darker the color of the precipitate, the harder it becomes to distinguish the starch end-point. This is very likely the cause of the divergence in the results given above.

It occurred to me that the addition of carbon disulphide might aid in detecting the true end-point, by dissolving the precipitate. The apparent end-point was taken in two cases, then CS_2 was added and the end-point redetermined. The results are given in Table 3. Even then, the end-point is not very distinct and the method still tends to give high results.

TABLE 2.

0.04001	31.50	0.9583	**13.70	1.0929	15.22	0.0026674	0.040598	101.47
			*13.85	1.0929	15.05	0.0026674	0.040144	100.33
0.04001	31.50	0.9583	13.65	1.0929	15.27	0.0026674	0.040731	101.80
			13.90	1.0929	15.00	0.0026674	0.040011	100.00
0.04001	31.60	0.9583	*13.95	1.0929	15.03	0.0026674	0.040091	100.20

** without CS_2.
* with CS_2.

Three analyses were run on the sample No. 4885, just as Mr. Wilkie directs, adding 150 cc water. In this case no precipitation occurred before acidification and the conversion went only slightly to the red quinone, but the results were still high. Three results obtained are: 100.89, 101.09, 100.83.

The following method, a modification of Messinger and Vortmann's, has been found quantitative in every case for the assay of sodium salicylate. The determination is based on the fact that iodine, in alkaline solution, will react with sodium salicylate to form tetra-iododiphenylene quinone $(C_6H_2I_2O)_2$. The tri-iodophenol which is formed first, decomposes into the above.[1]

Seidell[2] has shown that this reaction does not take place quantitatively under all conditions, but under the following conditions it is quantitative.

METHOD.

Weigh up 0.8 gram sodium salicylate accurately, dissolve, and make up to exactly 250 cc in a volumetric flask. Pipette into a glass-stoppered iodine flask 25 cc of the above solution. Add 30 cc of an approximately $N/10$ Na_2CO_3 solution. Add the equivalent of 33 cc of standardized $N/10$ iodine solution slowly from a burette. No precipitation should occur. Gradually heat the iodine flask, loosening the stopper every few minutes to relieve the pressure, until a precipitate forms and turns purple. Let the mixture stand for fifteen minutes. Cool and acidify with diluted sulphuric acid. Shake. The reddish purple precipitate coagulates nicely.

Filter quickly into a 500-cc Erlenmeyer flask, washing the flask and filter with water. Titrate with standardized $N/50$ sodium thiosulphate. Table 3 gives the consecutive results obtained by this method.

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[1] *J. Soc. Chem. Ind.*, 1911, page 398.
[2] *J. Am. Chem. Soc.*, 1909, page 1168.

TABLE 3.

DETERMINATION OF SODIUM SALICYLATE BY METHOD DESCRIBED ABOVE.

Wt. of sample.	No. cc iodine.	$N/10$ factor.	Cc sodium thiosulphate.	$N/10$ factor.	Cc $N/10$ I_2 used up.	Factor for sodium salicylate.	Wt. sodium salicylates calculated.	Per cent. sodium salicylate.
0.08000	33.00	1.0691	4.46	1.1885	29.98	0.0026674	0.079969	99.96
0.08007	31.00	1.0691	2.65	1.1885	29.99	0.0026674	0.079995	99.91
0.08007	31.00	1.0691	2.70	1.1885	29.93	0.0026674	0.079835	99.71
			Cc. $N/50$.	$N/50$ factor.				
0.08007	31.01	1.0691	15.75	0.9809	30.06	0.0026674	0.080182	100.14
0.08007	31.01	1.0691	15.65	0.9809	30.08	0.0026674	0.080235	100.21
0.08002	31.01	1.0691	16.30	0.9809	29.95	0.0026674	0.079889	99.84
0.08002	31.00	1.0691	15.92	0.9809	30.02	0.0026674	0.080075	100.07
			$N/10$.	$N/10$ factor.				
0.08008	32.00	1.0402	3.07	1.0929	29.93	0.0026674	0.079835	99.69
0.08016	33.02	1.0325	3.78	1.0929	29.96	0.0026674	0.079915	99.69
				Different sample.				
0.08004	34.50	0.9583	2.92	1.0929	29.87	0.0026674	0.079675	99.54
0.08004	34.50	0.9583	2.90	1.0929	29.89	0.0026674	0.079729	99.61

A comparison of results obtained by this method and that of Mr. Wilkie is given in Table 4.

TABLE 4.

COMPARISON OF RESULTS OBTAINED BY PROPOSED METHOD AND THAT OF WILKIE.

Sample No.	Wt. per 250 cc.	Per cent. by proposed method.	Per cent. by Wilkie's method.	Remarks.
4290	0.4004	99.69	99.59	
			100.39	
			101.33	
			100.19	
	0.4008	99.69	100.23	
			101.23	
			101.16	
			101.16	
4885	0.8004	99.54		
		99.61		
			101.47	Without addition
	0.4001		101.80	of CS_2
			100.33	
			100.00	With addition of
			100.20	CS_2
		99.73	100.89	
			100.83	
			101.09	Adding 150 cc H_2O

This method has now been adopted in the laboratories of Lehn & Fink in replacement of the U. S. P. IX method for the assay of sodium salicylate. It requires less time and does not require continual repetition to secure concordant results as the U. S. P. method does.

Three new commercial samples, supposedly U. S. P., have just been analyzed by two chemists unfamiliar with the method of analysis, with the following results: *a*, 99.72, *b*, 99.54, *c*, 99.59; *c* was checked as 99.59% exactly.

A commercial sample of phenol was assayed in this way for comparison with the result obtained by the U. S. P. IX method. The results were: U. S. P. method, 99.53%; above method, 99.46%.

TABLE 5.

Remarks.	No. acetyl salicylic.	Wt. per 250 cc.	Cc $N/10$ I_2.	Factor for I_2.	Cc $N/10$ $Na_2S_2O_3$.	Factor for $Na_2S_2O_3$.	Cc $N/10$ I_2 equivalent to aliquot.	Factor for acetyl salicylic.	Per cent.	Sample Nos.
A good commercial sample	23275	0.8800	31.81	1.0366	3.76	1.0062	29.19	0.003001	99.54	1
	23275	0.8800	31.80	1.0355	3.67	1.0062	29.24	0.003001	99.71	2
No odor	23275	0.8800	31.80	1.0266	3.45	1.0062	29.18	0.003001	99.51	3
Recrystallized		H 0.8837	33.00	1.0033	3.79	1.0083	29.29	0.003001	99.48	4
sample, dried		0.8837	33.00	1.0033	3.78	1.0083	29.30	0.003001	99.50	5*
at 40° and then		0.8837	33.00	1.0033	3.77	1.0083	29.31	0.003001	99.54	6*
over sulphuric		0.8801	33.00	0.9988	3.72	1.0083	29.21	0.003001	99.60	7
Two old samples. Odor of acetic acid	5871 (2B)	0.8804	31.80	1.0266	3.53	1.0062	29.10	0.003001	99.19	8
	5872 (4C)	0.8801	31.80	1.0266	3.47	1.0062	29.16	0.003001	99.43	9
						Limit of error				
						1 drop in final titration			0.17%	

* Hastings.

LABORATORY OF
LEHN AND FINK, INC.

ACETYLSALICYLIC ACID.

SUBMITTED BY WM. H. GESELL.*

The method now employed for assaying samples of sodium salicylate may be extended to the analysis of acetylsalicylic acid. Weigh up about 0.88 gram of the acid, add 20.2 cc $N/2$ KOH to this (0.2 cc excess of KOH over enough to convert the acid to the potassium salt) and heat on a steam-bath a half-hour. Transfer to a 250-cc volumetric flask, make up to volume, shake, and proceed as directed in the method for sodium salicylate. In the samples of recrystallized acetylsalicylic acid the above exact amount of KOH was not added, but about 20 cc of a 2% sodium hydroxide solution was used.

Samples Nos. 5 and 6 were analyzed by Miss Hastings.

The following results were obtained: The results obtained were much more satisfactory and more closely checked than those reported in the *Journal of Association of Official Agricultural Chemists*, May 15, 1922, page 582.

The volumetric bromine method as given there has two faults: (1) It is difficult to carry out the method without the loss of any trace of bromine. (2) The limit of error (1 drop in titration) is 0.35%. It has not been found possible to check the method very closely in our laboratory.

The gravimetric iodine method given as a tentative method is inaccurate in one respect. As has been pointed out in the literature by Messinger and Vortmann originally and later by Wilkie, the iodine compound only forms quantitatively under certain conditions, exactly the right concentrations of sodium carbonate and iodine. These conditions are realized in the above volumetric method but not in those of the Report.

LABORATORY OF
LEHN & FINK, INC.,
M. W. EVANS.

* October 9, 1922.

THE BIOLOGIC STANDARDIZATION OF LOCAL ANAESTHETICS.

WITH SPECIAL REFERENCE TO EFFECT OF STERILIZATION ON SOLUTIONS OF COCAINE AND PROCAINE.

(Continuation of a Previously Reported Paper.[1])

BY PAUL S. PITTENGER.

In a paper[1] read before this section last year, the author described a biologic method for the quantitative valuation of local anaesthetics. It was shown that the method described was sensitive to a variation of 1 mg. of cocaine and to 5 mg. of procaine.

The sensitiveness of the method suggested its adaptability for checking the effect of aging and the various forms of sterilization upon solutions of cocaine and procaine. Accordingly, a series of experiments were started as follows:

First.—Prepare a solution of cocaine and one of procaine of such strength that 1 cc will contain the *minimum* amount of salt that will produce local anaesthesia in 5 minutes when tested by the foregoing method, reserving a sample of each of the salts used.

Cocaine 0.6% solution
Procaine 7.0% solution } based on Experiments Nos. 1 and 2.[1]

Second.—Divide each solution into four portions, fill each portion into ampuls as follows:

(*A*) Fill into sterile ampuls without sterilizing or Berkfeldting.

(*B*) Add 0.3% Three Cresols, Berkfeldt and fill into sterile ampuls.

(*C*) Fill into ampuls and Arnold-sterilize on three consecutive days.

(*D*) Fill into ampuls and autoclave for 15 min. at 115° C.

Third.—Test each lot to determine effect of sterilization.

Fourth.—Test each lot every three months to determine rate of deterioration on standing.

Fifth.—At the end of six months make fresh solutions of the reserve salts and test to determine whether or not the salt deteriorates with age.

The results of the 18 experiments reported last year showed that the amount of solution of cocaine or procaine required to produce complete anaesthesia was exactly the same before and after the different forms of sterilization, thus indicating that *sterilization does not affect the activity of solutions of cocaine or procaine.*

It was also shown that the unsterilized solutions, the solutions sterilized with heat, and the solutions sterilized without heat, all possessed exactly the same activity after 3 months as immediately after being prepared.

Each lot of solution has again been tested 14 months after filling and sterilizing. The results of this final test on each lot as compared with the two previous tests follows:

Experiments Nos. 3, 4 and 19.

COCAINE SOLUTION 0.6%.

Filled into sterile ampuls without sterilizing or Berkfeldting.

Results.

Dose.	Expt. No. 3. Immediately after filling.	Expt. No. 4. 3 mos. after filling.	Expt. No. 19. 14 mos. after filling.
0.7	Sensitive	Sensitive	Sensitive
0.8	Sensitive	Sensitive	Sensitive
0.9	Sensitive	Very slightly sensitive	Sensitive
0.9	Not sensitive	Not sensitive	Sensitive
1.0	*Not sensitive	*Not sensitive	Sensitive
1.0	*Not sensitive	*Not sensitive	Sensitive
1.1	Not sensitive	Not sensitive	*Not sensitive.

[1] "The Biologic Standardization of Local Anaesthetics," JOUR. A. PH. A., Vol. X, No. 10, October 1921.

Minimum amount required to produce complete local anaesthesia is 1.0 cc for both Experiments Nos. 3 and 4, and 1.1 cc for Experiment No. 19.

Experiments Nos. 5, 6 and 20.

PROCAINE SOLUTIONS 7%.

Filled into sterile ampuls without sterilizing or Berkfeldting.

Results.

Dose.	Expt. No. 5. Immediately after filling.	Expt. No. 6. 3 mos. after filling.	Expt. No. 20. 14 mos. after filling.
0.8	Sensitive	Sensitive	Sensitive
0.9	Slightly sensitive	Sensitive	Sensitive
0.9	Slightly sensitive	Sensitive	Sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
1.1	Not sensitive	Not sensitive	Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for Experiments Nos. 5, 6 and 20.

Experiments Nos. 7, 8 and 21.

COCAINE SOLUTION 0.6%.

0.3% Three Cresols, Berkfeldted and filled into sterile ampuls.

Results.

Dose.	Expt. No. 7. Immediately after filling.	Expt. No. 8. 3 mos. after filling.	Expt. No. 21. 14 mos. after filling.
0.8	Sensitive	Sensitive	Sensitive
0.9	Very slightly sensitive	Sensitive	Sensitive
0.9	Sensitive	Slightly sensitive	Sensitive
1.0	*Not sensitive	*Not sensitive	Sensitive
1.0	*Not sensitive	*Not sensitive	Slightly sensitive
1.1	Not sensitive	Not sensitive	*Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for both Experiments Nos. 7 and 8, and 1.1 cc for Experiment No. 21.

Experiments Nos. 9, 10 and 22.

PROCAINE SOLUTION 7%.

0.3% Three Cresols, Berkfeldted and filled into sterile ampuls.

Results.

Dose.	Expt. No. 9. Immediately after filling.	Expt. No. 10. 3 mos. after filling.	Expt. No. 22. 14 mos. after filling.
0.8	Sensitive	Sensitive	Sensitive
0.9	Sensitive	Sensitive	Sensitive
0.9	Sensitive	Sensitive	Sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
1.1	Not sensitive	Not sensitive	Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for Experiments Nos. 9, 10 and 22.

Experiments Nos. 11, 12 and 23.

COCAINE SOLULION 0.6%.

Filled into ampuls and Arnold-sterilized on 3 consecutive days.

Results.

Dose.	Expt. No. 11. Immediately after filling.	Expt. No. 12. 3 mos. after filling.	Expt. No. 23. 14 mos. after filling.
0.8	Sensitive	Sensitive	Sensitive
0.9	Sensitive	Sensitive	Sensitive

Dose.	Expt. No. 11. Immediately after filling.	Expt. No. 12. 3 mos. after filling.	Expt. No. 23. 14 mos. after filling.
0.9	Sensitive	Slightly sensitive	Sensitive
1.0	*Not sensitive	Not sensitive	Slightly sensitive
1.0	*Not sensitive	Not sensitive	*Not sensitive
1.0	....	....	Slightly sensitive
1.1	Not sensitive	Not sensitive	*Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for both Experiments Nos. 11 and 12, and between 1.0 and 1.1 cc for Experiment No. 23.

Experiments Nos. 13, 14 and 24.

PROCAINE SOLUTION 7%.

Filled into ampuls and Arnold-sterilized on 3 consecutive days.

Results.

Dose.	Expt. No. 13. Immediately after sterilizing.	Expt. No. 14. 3 mos. after sterilizing.	Expt. No. 24. 14 mos. after sterilizing.
0.8	Sensitive	Sensitive	Sensitive
0.9	Sensitive	Sensitive	Sensitive
0.9	Sensitive	Sensitive	Sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
*1.0	Not sensitive	Not sensitive	Slightly sensitive
1.0	....	....	Not sensitive
1.1	Not sensitive	Not sensitive	Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for Experiments Nos. 13, 14 and 24.

Experiments Nos. 15, 16 and 25.

COCAINE SOLUTION 0.6%.

Filled into ampuls and autoclaved for 15 min. at 115° C.

Results.

Dose.	Expt. No. 15. Immediately after sterilizing.	Expt. No. 16. 3 mos. after sterilizing.	Expt. No. 25. 14 mos. after sterilizing.
0.8	Sensitive	Sensitive	Sensitive
0.9	Slightly sensitive	Sensitive	Sensitive
0.9	Not sensitive	Sensitive	Sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
1.1	Not sensitive	Not sensitive	Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for Experiments Nos. 15, 16 and 25.

Experiments Nos. 17, 18 and 26.

PROCAINE SOLUTION 7%.

Filled into ampuls, autoclaved for 15 min. at 115° C.

Results.

Dose.	Expt. No. 17. Immediately after sterilizing.	Expt. No. 18. 3 mos. after sterilizing.	Expt. No. 26. 14 mos. after sterilizing.
0.8	Sensitive	Sensitive	Sensitive
0.9	Slightly sensitive	Slightly sensitive	Sensitive
0.9	Sensitive	Sensitive	Sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
*1.0	Not sensitive	Not sensitive	Not sensitive
1.1	Not sensitive	Not sensitive	Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for Experiments Nos. 17, 18 and 26.

In order to determine whether or not the salts deteriorate with age, fresh solutions of the reserve salts were made after a period of 14 months and tested for comparison with the tests of the original solutions.

Experiment No. 27.

COCAINE SOLUTION 0.6%.

Made from reserve salt 14 months after solution tested under Experiment No. 3.

Results.

Dose.	Expt. No. 3.	Expt No. 27.
0.7	Sensitive	Sensitive
0.8	Sensitive	Sensitive
0.9	Sensitive	Sensitive
0.9	Not sensitive	Sensitive
*1.0	Not sensitive	Not sensitive
*1.0	Not sensitive	Not sensitive
1.1	Not sensitive	Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for both Experiments Nos. 3 and 27, showing that no deterioration takes place in cocaine during a period of 14 months.

Experiment No. 28.

PROCAINE SOLUTION 7%.

Made from reserve salt 14 months after solution tested under Experiment No. 5.

Results.

Dose.	Expt. No. 5.	Expt. No. 28.
0.8	Sensitive	Sensitive
0.9	Slightly sensitive	Slightly sensitive
0.9	Slightly sensitive	Slightly sensitive
*1.0	Not sensitive	Not sensitive
*1.0	Not sensitive	Not sensitive
1.1	Not sensitive	Not sensitive

Minimum amount required to produce complete local anaesthesia is 1.0 cc for both Experiments Nos. 5 and 28 showing that no deterioration takes place in procaine during a period of 14 months.

EFFECTS OF REPEATED STERILIZATION.

In the discussion of last year's paper it was stated that in some operations surgeons use solutions of cocaine as high as 20% in strength and that owing to the general opinion that resterilization destroyed its activity, in most hospitals all unused portions of such solutions were discarded.

Therefore, in order to determine the effects of resterilization upon the activity of solutions of cocaine and procaine, I prepared a 20% solution of cocaine and a 50% solution of procaine, and filled each into ampuls. One ampul of each lot was diluted to the proper strength and tested on dogs. The remaining ampuls were then autoclaved at 115° C. for 15 minutes. Another ampul of each lot was then diluted to the proper strength and tested. The remaining ampuls were again autoclaved at 115° C. for 15 minutes and another ampul tested. This procedure was repeated until each lot was sterilized and tested five times.

The results of these experiments follow:

COCAINE 20% SOLUTION.

Solution.	Amount required to produce complete local anaesthesia.	Physical appearance.
Before sterilization	1.0 cc (0.6%)	Clear, colorless
After 1st sterilization	1.0 cc (0.6%)	Clear, colorless
After 2nd sterilization	1.0 cc (0.6%)	Clear, colorless
After 3rd sterilization	1.0 cc (0.6%)	Clear, colorless
After 4th sterilization	1.0 cc (0.6%)	Clear, colorless
After 5th sterilization	1.0 cc (0.6%)	Clear, colorless

PROCAINE 50% SOLUTION.

Solution.	Amount required to produce complete local anaesthesia.	Physical appearance.
Before sterilization	1.0 cc (7.0%)	Clear, colorless
After 1st sterilization	1.0 cc (7.0%)	Clear, amber
After 2nd sterilization	1.0 cc (7.0%)	Clear, amber
After 3rd sterilization	1.0 cc (7.0%)	Clear, amber
After 4th sterilization	1.0 cc (7.0%)	Clear, amber
After 5th sterilization	1.0 cc (7.0%)	Clear, amber

These results show that five successive sterilizations produced no apparent effect upon the activity of the above solutions of cocaine and procaine.

It will also be noted that sterilization at 115° C. changes the procaine solution from colorless to an amber color, and that this change is not accompanied by any change in activity.

CONCLUSION.

The activity of local anaesthetics can be quantitatively determined by the method proposed.

The activity of solutions of cocaine and procaine is not affected by the addition of 0.3% Three Cresols or by sterilization by means of the Arnold sterilizer or autoclave at 115° C. for 15 minutes.

Unsterilized solutions of cocaine and procaine, solutions sterilized without heat and solutions sterilized with heat apparently lose no activity during a period of 3 months.

Unsterilized solutions of cocaine and solutions of cocaine sterilized without heat apparently lose about 10% of their activity during a period of 14 months.

Solutions of cocaine which have been Arnold-sterilized apparently lose about 5% of their activity during a period of 14 months.

Solutions of cocaine which have been autoclaved for 15 minutes at 115° C. apparently lose no activity during a period of 14 months.

Unsterilized solutions of procaine, solutions sterilized without heat and solutions sterilized with heat, lose no activity during a period of 14 months.

Cocaine and procaine in the dry form are apparently stable and show no signs of deterioration during 14 months.

Concentrated solutions of cocaine or procaine can be sterilized five successive times at 115° C. without any apparent loss of activity.

Finally the author wishes to acknowledge his indebtedness to Mr. Arnold Quici for his able assistance in connection with the laboratory work.

PHARMACODYNAMIC LABORATORY,
H. K. MULFORD COMPANY,
AUGUST 8, 1922.

COLLOID CHEMISTRY AND ITS APPLICATION IN PHARMACY.*

BY C. B. JORDAN.[1]

When one of my friends read this title, his comment was "Well, that is some job." Since I have begun it, I agree with him. In fact, the task is so great, I cannot hope to accomplish it, but only touch upon the bare outlines of the subject. Colloid chemistry has grown so rapidly it has now become a separate branch of the general subject and courses are offered in it, just as we have courses in general chemistry, qualitative and quantitative analysis, organic chemistry, physical chemistry, etc. A laboratory manual of colloid chemistry has recently appeared. The subject is so comprehensive, I can only hope to scratch the surface. If I am able to point out part of the ramifications of colloid chemistry in pharmacy, I will be content.

Bancroft says that colloid chemistry is the chemistry of grains, drops, bubbles, filaments and films. It is the chemistry of small things, grains or small solid particles, drops or small liquid particles, bubbles or small gas particles, filaments in which all dimensions are small but one, and films in which only one dimension is small. Strictly speaking there is no such thing as colloid chemistry, because most if not all substances can be made in a sufficiently finely divided condition to be in the "colloidal state." Holmes describes this state of a substance as existing in particles between 100 millimicrons and 0.1 millimicron in diameter. (A millimicron being one-millionth of a millimeter in diameter.)

The smallest particle that can be seen by our best microscope is about 100 millimicrons in diameter. Therefore we are speaking, roughly, of substances that are between 100 millimicrons and 0.1 millimicron in diameter. If we can subdivide a substance until it falls between these limits, it is in the colloidal state. It is the mere matter of size of particles and each particle is perhaps made up of hundreds or thousands of molecules.

Colloids have some of the characteristics of true solutions. They are clear to the naked eye and to the best microscopes and they are unfilterable, but they give color and can, by the aid of the ultramicroscope, be shown to consist of minute particles. They have many characteristics that true solutions do not have, they show great adsorptive power, they often act as protectives preventing precipitation or coalescence, they can be precipitated by strong electrolytes, and they can be purified by dialysis.

Adsorption.—Holmes states that adsorption is a "surface holding" and depends largely, if not wholly, on extent of surface. If this be true, a finely divided substance or colloid will show great adsorptive power. We can better understand how subdivision increases surface by an illustration: A cube 1 cm. on edge has 6 sq. cm. of surface. If this cube be subdivided until it is 100 millimicrons on edge, the surface is 600,000 sq. cm. and the number of particles is increased to 10^{18}. We have increased the surface 100,000 times. Since adsorption is a function of surface extent, we have greatly increased the adsorptive power. Adsorption is one of the most important characteristics of colloids and advantage is taken of it in many industrial processes.

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* Section on Education and Legislation, A. Ph. A., Cleveland meeting, 1922.

[1] Purdue University.

The greater part of the efficiency of gas masks depended upon the adsorptive power of the charcoal filler. Filter paper adsorbs appreciable quantities of Ba, Ca and Sr hydroxides, therefore in quantitative analysis weak standard solutions of these substances should not be filtered. Bancroft states that when $^1/_2$ grain of strychnine was added to $^1/_2$ gallon of water and this was shaken with 2 ounces of animal charcoal and filtered, the filtrate did not show a trace of strychnine even with our most delicate tests. The strychnine was recovered from the charcoal by shaking with alcohol. We have all used charcoal to remove color from organic solutions. We must bear in mind that the charcoal may remove some of the constituents we are endeavoring to secure. In the purification of alkaloids, animal charcoal has been used. Here again there is danger of losing the alkaloid. The disagreeable odor of raw whisky can be removed by leaching it through charcoal due to the adsorptive power of the charcoal.

A fine-grained sponge will hold 30 Gm. of water per Gm. of sponge, and a coarse-grained one will hold 5 or 6 Gm. of water per Gm. of sponge. Absorbent cotton could well be called adsorbent cotton, because its value rests in a great measure upon its adsorbent properties. Here we have an example of a filament colloid with all dimensions small except one. Good absorbent cotton will hold 4 grams of water when centrifuged at 4000 r. p. m. Part of the water is held in capillary spaces and part adsorbed upon the surfaces. Sphagnum moss will imbibe 200 times its own weight of water. This explains its use as a dressing in the trenches.

There has been considerable discussion regarding the mechanism of the starch-iodide combination. It was once thought to be a chemical combination, but it is more than likely that the starch adsorbs the iodine. If a weak solution of iodine is filtered through charcoal, it can be made colorless. This is a new method of preparing colorless iodine preparations. The resulting liquid will probably be as efficient as that prepared by the use of sodium thiosulphate. Phosphate baking powders are protected from moisture by starch. It is important that the calcium phosphate be not too finely ground nor the starch too coarse. Here the starch adsorbs the moisture and thus prevents reaction between the phosphate and the carbonate.

In the determination of alums, we must use care as the aluminum hydroxide has a tendency to become colloidal and adsorbs ions that may not be volatilized on heating. The precipitate should be well washed and, if possible, volatile salts should be used in precipitation. Owing to adsorption indicators are often unreliable in determining the hydrogen ion in protein solutions. We should take this into consideration when determining the acidity of albuminous urine.

Selective Adsorption.—Colloids often show selective adsorption, adsorbing some ions and not others, or some ions to a much greater extent than others. Infusorial earth is used to clean greasy glass because it has selective adsorption for the grease. Many spot cleansers owe their efficiency to selective adsorption. Holmes states that when $AgNO_3$ is added to a slight excess of KI a negative colloid is formed, due to the selective adsorption of the iodide ion. If, on the other hand, a slight excess of $AgNO_3$ is present, a positive colloid is formed, due to the adsorption of the positive Ag ion. The salt shows selective adsorption for its own ions.

Selective adsorption may cause neutral salt solutions to show basic or acidic reactions. Neutral solutions will become acidic if shaken with colloids that adsorb

bases, and alkaline if shaken with colloids that adsorb acids. Bancroft says that if fuller's earth be shaken with a solution of sodium chloride and the solution filtered, the filtrate will be acid to litmus. If you press litmus against moistened fuller's earth, it turns red. If you add fuller's earth to a slightly alkaline solution of phenolphthalein the red color disappears. The fuller's earth has in each case adsorbed the base. Advantage can be taken of this to remove a small amount of base from solution. We are all familiar with the fact that linseed oil will displace water in contact with white lead, the lead showing selective adsorption for the oil. The cleansing action of soap is due in a great measure to the selective adsorption of dirt. If the soap be alkaline it will saponify the grease, but its efficiency rests chiefly upon its adsorptive power. In hot water some soap goes into solution but most soap solutions are colloidal and hence show adsorption.

Peptization.—It is a well-known fact that pepsin changes coagulated egg-white to peptones if a trace of HCl be present. The albumin is changed to the colloidal peptones. Graham called this peptonization, but most colloidal chemists to-day call it peptization; that is, when a colloidal gel is converted into a sol or subdivided into particles far larger than molecules it is peptized. Holmes says that acacia, glue, gelatin, soap and dextrine are not dissolved in water but are peptized by the water and they are really colloidal solutions. The same is true of our collodions. They are not true solutions. The guncotton is peptized by the ether-alcohol menstruum, rendering them colloidal suspensions. Bancroft makes an observation that should be of deep interest to pharmacists. He says "It is not very easy to peptize gum arabic by grinding with water because the water does not readily displace the air from the gum. If the gum is ground a moment with alcohol, the water wets it readily. This is surprising because water peptizes the gum and alcohol does not, one would consequently have expected it to be adsorbed more strongly than the alcohol. It is possible that there is a film of grease on the gum which is removed by the alcohol. It is also possible that the alcohol displaces the air more rapidly because it absorbs air more strongly than does water." If what Bancroft says is true, it would be better to grind gum arabic with a little alcohol before adding water in making emulsions. This is worth investigating.

Peptization of precipitates by adsorbed ions is common. The colloid becomes positive or negative depending upon whether positive or negative ions are adsorbed. Clays are more easily peptized if a trace of alkali be present, due to the preferential adsorption of hydroxyl ions. Advantage of this is taken in making colloidal suspensions of clay. A suspension of clay with a trace of base, iron and organic matter can be made so fine that each particle shows Brownian movement. In a recent analysis of a fake hog cholera preparation, I found this to be true.

Protective Colloids.—It has been known for years that certain substances aid in keeping precipitates in suspension. We often use them in pharmacy to peptize precipitates and keep them in a fine suspension. The action of gelatin in protecting AgI, AgBr and AgCl is a common one and often used in pharmacy. Gelatin, casein, albumen, agar, dextrine, acacia, tragacanth and glue interfere with the precipitation of many insoluble compounds and hence act as protective colloids.

There are two or three theories advanced to explain the action of protective colloids. Some chemists believe that the colloid forms a film around the particles

and prevent them from uniting. Others believe that they are solvated colloids and "bind" the water. Others believe that the action is due to the adsorption of the protective colloid and the protected precipitate by each other. No matter what the explanation of this action, it is important that pharmacists be aware of their value in keeping precipitates in suspension.

The efficiency of the different protective colloids is of importance. Zsigmondy has determined the relative protective power of these substances and expresses it as the "gold number" of the colloids. The gold number is the number of milligrams of protective colloid which just prevents the color change in a 10-cc red-gold solution when 1 cc of a 10% NaCl solution is added. A study of Zsigmondy's table is of interest. The table follows:

Substance.	Gold No.	Reciprocal of Gold No.
Gelatin and glue	0.005–0.1	200–100
Casein	0.01–0.02	100–50
Acacia (good)	0.15–0.25	6–8
Acacia (poor)	0.5–0.4	2–2.5
Tragacanth	2	0.5
Dextrine	(6–12)	(0.17–0.08)
	(10–20)	(0.1–0.05)

If Zsigmondy's gold numbers mean anything, they are worthy of study. The table shows that gelatin is 20 times more efficient as a protective colloid than good acacia and casein is 10 times more efficient. Zsigmondy indicates that there is considerable difference in protective power of good and poor acacia, the good being 3 to 6 times as efficient as the poor. I sometimes think that pharmacists are too well satisfied with acacia in emulsion preparation. If gelatin is 20 times as efficient in protective power, why not use it? This seems to be a fertile field for investigation. Out of such research may come a better method for preparing emulsions.

Protective colloids are not very sensitive to electrolytes and salt solutions may be added to suspensions containing them without causing precipitation. Argyrol, protargol, collargol and silvol are said to be of this nature. A little gelatin added to ice cream acts as a protective preventing the formation of small ice crystals and giving a smooth velvety taste. Lactalbumin of milk has high protective value and mothers' milk contains more of it than cows' milk. Some physicians advocate the addition of a little gelatin to cows' milk in infant feeding as the curd formed is of looser texture and more easily digested.

Coagulation of Colloidal Suspensions.—Colloids are either positively or negatively charged, depending upon whether the adsorbed ion is positive or negative. Electrolytes, neutralizing the charges, cause coagulation of colloidal suspensions. All pharmacists are familiar with the difficulties experienced in adding acids, alkalies or solutions of salts to emulsions. In analysis we precipitate arsenic from a strongly acid solution to prevent colloidal As_2S_3 from being formed. We also wash $Al(OH)_3$ with a solution of ammonium nitrate to prevent it from becoming colloidal and running through the filter paper. The action of salt solution in precipitating casein in making cold creams is of this nature.

The precipitating power of ions varies with the valence of the ion of charge opposite to that of the colloid. Svedberg determined that the concentration of

K^+, Ba^{++} and Al^{+++} required to aggregate particles of As_2S_3 to the same degree stood in the ratio of 1000 : 50 : 1; that is, with an increase of valence we get the precipitating efficiency increased many times. Hatschek has shown that $AlCl_3$ is 500 times as efficient as NaCl and seven times as efficient as $CaCl_2$. This would indicate that it is less dangerous to the suspended colloid to dilute it with a solution of an electrolyte of one charge than with an electrolyte of more than one charge.

Some colloids are readily coagulated by heat. Glue, gelatin, agar, albumin and jelly-like or giving substances are not readily coagulated by a low concentration of an electrolyte but are readily coagulated by heat. The heat test for albumin in urine belongs to this class while the nitric acid test belongs to the electrolyte class. It is believed that the formation of deltas is due to the coagulation of the suspension by the electrolytes in the sea water.

Elutriation is, in a measure, a function of colloidal particles. The smaller particles settle slower because they are wetted slower and hence a separation can be made. The finely divided clay mentioned above was probably prepared in this way. The size of the particles greatly influences the time of settling. $BaSO_4$ cannot be filtered if precipitated cold, but if precipitated hot and digested larger particles are produced. The smaller particles are more soluble and they dissolve and deposit upon the larger ones. Hulett found that $CaSO_4$ (1.8 micron) was soluble 2.29 mg. per liter at 25° and the same $CaSO_4$ ground to 0.1 micron was soluble 4.5 mg. in a liter. Solubility can be increased by reducing the substance to a fine state of subdivision. Holmes says that red oxide of mercury ground in a mortar turns yellow and its solubility is increased three-fold. I have not had an opportunity to test the truth of this statement but I have found that grinding red oxide changes its color toward the yellow.

In the Fehling test for sugar in urine, we often get a change of color from yellowish green to yellow, to orange, to red, depending upon the size of the particles of Cu_2O. Holmes says that too much reducing sugar is likely to yield only the greenish discoloration. With much sugar the number of points at which the copper salt is attacked and reduced will be much larger and all the copper salt will be used up while the particles of oxide are still small and thus it gives only a greenish coloration. He recommends reduction at low or room temperature and long standing. I must confess I have never had the difficulty that Holmes speaks of except that sometimes the red precipitate is slow in forming.

Dialysis.—Graham was the first to discover that certain substances would pass through a membrane and others would not. Those that would not pass through were glue-like so he called them colloids from colla (glue). As our knowledge of these things increased we discovered that there perhaps are no true colloids but most if not all substances can be made colloidal, that is, we should speak of the colloidal state instead of speaking of colloids. From Graham's work we have learned that substances in the colloidal state will not pass through membranes and others in the molecular state will. Industrial processes for the purification of colloidal substances depend upon this fact and we use dialyses frequently. Serums are purified in this way.

Holmes says that the speed of dialysis depends upon four factors: first, nature of the membrane; second, the area of membrane in contact with the liquids on both sides; third, the difference in concentration of the diffusible substance on

both sides of the membrane; fourth, the temperature of the two liquids. The first three of these are nearly axiomatic but the fourth factor may be overlooked in speeding up dialysis.

Emulsions.—This subject needs no discussion before pharmacists except perhaps to point out the differences in protective power of colloids as before mentioned. It may be interesting to some to state that we may have two types of emulsions depending upon which substance is in the dispersed phase. We may have emulsions of oil in water in which the oil is dispersed or we may have emulsions of water in oil in which the water is in the dispersed phase. Much work has been done upon emulsions, but unfortunately for the pharmacists the workers used soaps, calcium and magnesium oleates, etc., as protectives, things that cannot be used in pharmacy. Holmes and Bancroft both believe that pharmacists are too particular, especially too minute in their directions for preparing emulsions.

One fact is of importance to us and that is that intermittent shaking is better for preparing emulsions than continuous shaking. Perhaps this explains why so many housewives are successful in making mayonnaise, that is, they shake it intermittently, doing other duties between times.

Effect of Division on Metals.—Finely divided metals show a much greater activity than do those that are not divided. Metallic mercury is not absorbed by the skin, but emulsified metallic mercury, mercury ointment, is absorbed readily. Finely divided metals act as good catalysts because of the surface expansion. They have been successfully used in the dehydrogenation processes. Reduced copper at 150° will convert borneol into camphor and geraniol into citral. The former is used as an industrial process.

Finely Divided Powders.—If we control the fineness of two powders, we can, on mixing them, cause either one to be adsorbed by the other. Bancroft has an interesting experiment as follows: 0.032 Gm. of Prussian blue was mixed with 10 Gm. of dolomite which passed a 40-mesh sieve but did not pass a 100-mesh sieve. The resulting mixture was a deep blue due to the fact that the fine blue particles were adsorbed by the larger white ones. In another experiment the same amounts of the Prussian blue and dolomite were used but they were both ground until they passed a 200-mesh sieve. The resulting mixture was practically white. Thus you see we can control the color of mixtures of this kind by controlling the fineness of the powders. A favorite preparation given by state boards in their practical examination is a powder consisting of charcoal and magnesium oxide. One of the purposes of the preparation is to determine the neatness of the applicant. Many applicants have the charcoal all over the desk, hands and even the face. If the applicants were permitted to control the fineness of these powders, they could surprise the board by getting a mixture that would be nearly white.

Practically the whole field of bio-chemistry is colloidal chemistry because the fluids of the body are colloidal suspensions. The pharmacist who is engaged in the analysis of body fluids will find an understanding of colloidal chemistry necessary. There is much work to be done in the three fields, colloidal chemistry, biochemistry and pharmacy, before these three sciences articulate properly. The fields are fertile ones for investigation and I hope that our share of original investigation will be done by pharmaceutically trained men.

A METHOD FOR ASSAYING UNGUENTUM STRAMONII.*

BY A. R. BLISS, JR., AND M. F. BROWN.

INTRODUCTION.

The Pharmacopœia of the United States, Ninth Decennial Revision[1] gives no method for standardizing Unguentum Stramonii. The official formula for this ointment calls for

Pilular extract of stramonium	10 Gm.
Diluted alcohol	5 mils
Hydrous wool fat	20 Gm.
Benzoinated lard	65 Gm.
To make *about*	100 Gm.

Since the official Extractum Stramonii[2] is required to yield not less than 0.9 per cent. nor more than 1.1 per cent. of the alkaloids of Stramonium, it follows that the official Unguentum Stramonii should yield, when made by the official formula above, *about* 0.1 per cent. of the alkaloids of Stramonium.

THE METHOD.

The following method, adapted by the authors from the assays of Extractum Stramonii,[3] Extractum Belladonnæ Foliorum,[4] and Fluidextractum Belladonnæ Radicis,[5] gives very accurate results as reported below in the experimental data.

Introduce 30 Gm. of Ointment of Stramonium into a 250-mil centrifuge flask. Then add 150 mils of a mixture of ether, *2 volumes*, and chloroform, *1 volume*, followed by 10 mils of ammonia water. Shake the mixture vigorously until all fatty matter is dissolved, and then continue to shake for three hours on a mechanical shaker. Allow the mixture to stand† until complete separation has taken place, and then decant 100 mils of the clear liquid, representing 20 (twenty) grams of the ointment, into a separator. Then extract the alkaloids from the solution in the separator by shaking out repeatedly with weak sulphuric acid until the alkaloids are completely removed. Collect the acid washings in a separator, add ammonia water until the solution is decidedly alkaline to litmus, and completely extract the alkaloids by shaking out repeatedly with chloroform. Evaporate the combined chloroform washings to dryness, dissolve the alkaloids from the residue in exactly 5 mils of tenth-normal sulphuric acid V. S. and titrate the excess of acid with fiftieth-normal potassium hydroxide V. S., using cochineal T. S. as indicator.

Each mil of tenth-normal sulphuric acid V. S. consumed corresponds to 28.92 milligrams of the alkaloids of stramonium.

EXPERIMENTAL DATA.

The Samples.—Samples of Ointment of Stramonium were prepared by accurately weighing 3 Gm. portions of Pilular Extract of Stramonium in 250-mil centrifuge flasks, warming on a water-bath until the extract was soft, adding 1.7 mils of diluted alcohol and working the alcohol into the extract with a glass stirring rod. Then 7 Gm. of melted hydrous wool fat were added to the contents of each flask and thoroughly mixed; and finally 21 Gm. of melted benzoinated lard were added to each flask in the same manner. The stirring rods were then removed, carefully wiped with small pieces of filter paper, and the pieces of filter paper then placed in the proper flasks. The 150-mil portions of the ether-chloroform mixture were then added, and the above assay carried. At the same time, samples of the same Pilular Extract of Stramonium (2 Gm.) were assayed. The results follow.

* Scientific Section, A. Ph. A., Cleveland meeting, 1922.

† The method may be hastened by centrifuging.

Sample Number.	Assay of ointment, Per cent.	Assay of extract, Per cent.
1	0.843	0.832
2	0.829	0.820
3	0.881	0.835
4	0.857	0.829
5	0.849	0.836
6	0.838	0.822
Average	0.8495	0.829

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[1] U. S. P. IX, 1916, p. 482.
[2] U. S. P. IX, 1916, p. 161.
[3] U. S. P. IX, 1916, p. 161.
[4] U. S. P. IX, 1916, p. 144.
[5] U. S. P. IX, 1916, p. 178.

FROM THE LABORATORIES OF PHARMACOLOGY OF THE SCHOOL OF MEDICINE OF EMORY UNIVERSITY, ATLANTA, GA.

HOT EXTRACTION OF DRUGS.*

BY WILBUR L. SCOVILLE.

The problem of economical extraction of drugs is serious to the drug manufacturer. The increasing use of standardized preparations calls for a nearly complete extraction of the active or soluble constituents of a drug, and the amount of menstruum needed for this as well as the time involved and cost of concentrating the weaker percolate are all factors in the cost of the product. Any method of procedure which will hasten the exhaustion, or reduce the amount of percolate needed, will be likely to materially reduce the cost of manufacture and also produce a more stable product. For precipitation in galenical preparations depends in large measure upon exposure to light and air, and the less the volume of percolate the less is the exposure, and the smaller the precipitation.

Since heat favors the solution of plant constituents as it does of synthetic or natural chemicals, hot extraction has often been advocated for the more slowly exhausted drugs. But in drugs we have other factors beside the soluble or active constituents. It is desirable to extract the soluble or active constituents with as little of the inert materials as possible so that stability in the finished preparation may be promoted. Moreover, many drugs contain enzymes which act upon other constituents and either produce the desired properties, as in the case of cyanogen products in wild cherry, or of the volatile oil in the case of mustard, or else may destroy the active constituent as in strophanthus. The question of the influence of heat on these enzymes is therefore important. Then there is to be considered the action of heat on both the active constituents and on the inert. Few of the active constituents of drugs are injured by a moderate heat, if not too long continued and if protected, in part, from the action of air while hot. On the other hand, it was shown in the case of licorice[1] that the albuminoid principles of this drug are coagulated by

* Scientific Section, A. Ph. A., Cleveland meeting, 1922.

[1] "The Extraction of Licorice," JOUR. A. PH. A., 10, 688, 1921.

heat and so separated from the desirable glycyrrhizin, which is uninjured by the temperature of boiling water. Here is an instance of a drug which yields a far superior preparation when extracted with boiling water, to that prepared with cold water. The heat rejects undesirable constituents and favors the extraction of the desirable ones.

For experimental purposes, three plans of hot extraction have been tried. In the case of aqueous menstruum, as with licorice, a beaker fitted as a Squibb well-tube percolator, which can be set directly on a steam-bath and kept there during the process of extraction, is a convenient plan. The evaporation is counterbalanced by keeping the drug well covered with water, and renewing it with hot water instead of cold. This keeps the drug and menstruum at a fairly uniform temperature, even with small quantities, during the whole process.

For alcoholic menstrua a special apparatus was made consisting of a copper percolator of the usual form, having a capacity of about 800 cc and provided at the bottom with an extra delivery-tube issuing at one side of the usual delivery. This was enclosed in a larger percolator of corresponding shape, so that there was a space of about 10 mm. between the two percolators. The larger percolator was fitted with a conical top, arranged to be clamped on and connected with a reverse condenser by which the volatilized menstruum would be condensed and dropped on the drug in process of exhaustion. The moistened drug was packed in the inner percolator, saturated with menstruum, and connected tightly to a flask at the lower end by means of a perforated stopper. On connecting the condenser, and applying heat to the flask, the menstruum contained therein was boiled, the hot vapors passing up through the space between the two percolators and into the condenser where it was liquefied and dropped on the drug. The drug was thus kept hot by the heated vapors which also reheated the condensate. The percolate could be collected either in the distilling flask through the straight tubulure, or drawn out through the side tubulure and collected in another flask or bottle. Three drugs were treated in this apparatus, *viz.:*

Cinchona.—250 Gm. of cinchona calisaya assaying 5.3% of total alkaloids were extracted in the usual way (cold) with a menstruum (*a*) 250 cc of 76% alcohol containing 1.75% of hydrochloric acid, followed by (*b*) neutral 76% alcohol. The first 200 cc of percolate obtained assayed 3.02% of alkaloids, indicating 57.0% of exhaustion, and the finished fluidextract assayed 4.6% of alkaloids, indicating 86.8% of exhaustion.

Another portion of 250 Gm. was extracted hot in the apparatus described, using the same menstrua and general process except that heat was employed. The first 200 cc of percolate assayed 2.67% of alkaloids, showing 50.4% of exhaustion, and the finished fluidextract assayed 4.92% of alkaloids, showing 92.4% of exhaustion.

In this experiment a small advantage is shown for the hot method, though less perhaps than might be looked for. But the figures tell only a part of the story. Percolation was at first normal in flow, but it gradually slowed up until at the last the percolator appeared to be clogged and the flow was very reluctant. Repacking the drug did not help materially. Doubtless what happened is that the hot hydrochloric acid acted upon the tannins in the cinchona, changed them into phlobaphenes and clogging resulted. The initial maceration was made in the cold, so that the phlobaphenes were not fully formed until after a considerable portion of the

percolate had been obtained, then clogging became evident. It is highly probable that this effect would be emphasized in operations on a large scale, and render it impracticable. For this reason, further experiments on cinchona by the hot process were not made. The real objection to the hot process on cinchona is the way it acts.

Ipecac.—The stronger alcoholic menstruum which was directed until the last revision gave little trouble in the extraction of ipecac, but it produced a fluidextract which did not mix well with syrup. The weaker menstruum of the last revision makes syrup-making easy, but it does not exhaust the drug well. Therefore, hot extraction in the above apparatus was tried.

A sample of fluidextract was made from a Rio ipecac assaying 2.8% of alkaloids by the U. S. P. process. The first 200 cc of percolate assayed 1.85% of alkaloids, showing 49.3% of exhaustion, and the finished product assayed 1.97% of alkaloids, showing 70.0% of exhaustion.

By the hot process the following results were obtained. The first 200 cc assayed 1.296% of alkaloids, showing 46.3% of exhaustion, and the finished product 1.687% of alkaloids, indicating 60.2% of exhaustion.

Here again the drug clogged in the hot process, and finally refused to run It was impossible to carry the percolation to the usual amount, and, of course, the drug was far from being exhausted.

When the drug was taken from the percolator it was found to be in a gelatinous condition due to the action of the hot menstruum on the starch. This shows another limitation of the hot method. It cannot be applied to starchy drugs with a weakly alcoholic menstruum because the hot fluid cooks the starch and makes it gelatinous and obstructing.

By using a 71% alcoholic menstruum containing 0.8% of hydrochloric acid in the first 250 cc there was obtained 70.3% of exhaustion in the first 200 cc of percolate and 75% in the final product. The stronger alcohol and more acid is undoubtedly the better menstruum for ipecac.

Physostigma.—This is a drug which is difficult to exhaust and also difficult to assay. It may be a question at times whether the assay or the extraction is chiefly at fault, but there is no doubt that extraction is troublesome. This was also tried in the hot extraction apparatus.

The drug used assayed 0.1936% of physostigmine. The menstruum used consisted of 80% alcohol containing in the first portion 0.25% of acetic acid.

By cold percolation, using 250 Gm. of drug, the first 200 cc assayed 0.125% of alkaloid, showing 51.6% of exhaustion, and the finished fluidextract assayed 0.143% of alkaloid, showing 73.8% of exhaustion. By the hot process the figures were for the first 200 cc 0.140% alkaloid equal to 72.3% of exhaustion, and 0.172% alkaloid equal to 89% of total exhaustion.

Using 95% alcohol containing a like amount of acetic acid very similar results were obtained, *viz.*: 51.6% and 76.4% of exhaustion in the cold, and 74.8% and 90.0% of exhaustion by the hot process. Here is shown a marked advantage in the hot process, but the total extraction is yet lower than is desirable.

By the cold percolation, using a menstruum of 80% alcohol containing 0.3% of hydrochloric acid in the first 250 cc, there was obtained 72.3% of exhaustion in the first 200 cc and 89% in the final product. Ninety-five per cent. alcohol containing 2.3% of hydrochloric acid in the first portion gave very similar results. Thus the

more acid menstrua are more efficacious for physostigma, and therefore more economical. The expense of the special apparatus for hot extraction and the cost of operating it are not sufficiently advantageous to warrant it, in view of the fact that more acid menstrua give quite as good results.

Other experiments have been made on the extraction of physostigma which show that the size of powder used is an important factor in the extraction. A drug in No. 40 powder yields 70% of its total alkaloid to 71% alcohol and the same drug in No. 60 powder yields 88% of its activity to the same menstruum. When 1% of salicylic acid was added to the menstruum a yield of 96% of its activity was obtained. With ½% of benzoic acid 83% and with ½% of hydrochloric acid 90% was obtained—using a No. 60 powder in each case. Thus the factors of acid in the menstruum and the fineness of the powder employed are more important than higher temperature in extracting this drug. Furthermore, precipitation is much greater in the fluidextract made by hot percolation than in any of the others.

Nux Vomica.—A number of experiments have been made on the extraction of whole nux vomica beans by digestion with aqueous acid. The process consisted in simply digesting the whole beans in a beaker with sufficiently acidulated water to cover them and after 24 hours pouring off the liquid and repeating the process. The beans usually had about eight hours of heating and sixteen hours more of maceration in a warm place. A 1% sulphuric acid was found to extract the alkaloids more rapidly than a 2% acetic acid. The rate of extraction with one-half to one per cent. sulphuric acid is shown in the following results obtained by treating 250 Gm. of the beans. The figures show the proportion of alkaloids contained in the beans extracted in each treatment.

	Per cent.
First portion	31.71
Second portion	31.14
Third portion	16.23
Fourth portion	13.41
Fifth portion	3.90
Sixth portion	2.04
Seventh portion	0.11
Eighth portion	0.03
Total extracted	98.57

The first four portions extracted 92.5% of all the alkaloids in the drug. Cold water softens and penetrates the whole beans so slowly that the process without heat would be impracticable. So for aqueous extraction heat has a decided advantage in treating nux vomica.

Vanilla.—Vanilla beans are notoriously slow in yielding up their virtues, and are especially difficult to percolate because they contain so much albuminoid material. Most of the manufacturers of vanilla preparations extract the beans by long-continued macerations. One large dealer in vanilla extract has a series of vats in which the chopped beans are macerated in the menstruum and the tanks are used in sequence and so regulated that no extract is less than six months old when it is drawn off from the macerated beans. This is an expensive method of aging and extracting but he considers that it is worth while.

Other manufacturers are reported to hasten the process by digesting the beans in the menstruum, instead of macerating them.

For experimental purposes the following simple method was employed:

The ground or chopped beans were placed in a flask of suitable size, and 200 cc of menstruum poured on for each 100 Gm. of beans used. This is just enough to cover the beans well after they are thoroughly swollen in the menstruum. The flask is then fitted with a reflux condenser and placed in a sand-bath where it is heated to a little below the boiling point of the menstruum, or to about 60° C. After digesting 48 hours the liquid is poured off and enough fresh menstruum added to cover the beans. The process is repeated until the required volume of extract is obtained—usually four or five digestions.

Preparations so made compare well in strength and quality of flavor with others made from the same beans by longer processes of maceration and percolation.

But an added advantage in this heat treatment of vanilla lies in the fact that the heat coagulates some of the albuminous bodies in vanilla and produces a clearer preparation. It is well known that clear preparations of vanilla are difficult to get when a menstruum of 49% of alcohol or less is used, and that filtration of the cloudy extract is slow and tedious in all cases and almost impossible in some. The heat coagulates some of the viscid and slimy pseudo-solutions and enables the liquid to be filtered. Thus a practically clear extract is obtained in a menstruum containing less than 49% of alcohol, and without special difficulty in filtration or the need of a clarifying agent.

SUMMARY.

Hot extraction has been tried on six drugs of different types, with the following results:

1. Drugs containing a considerable proportion of albuminous matter which is coagulated by heat, and which are extracted with an aqueous or weakly alcoholic menstruum are better extracted by the hot menstruum. Licorice, vanilla and nux vomica are examples—the latter two when extracted with weakly alcoholic menstrua or with water.

2. Drugs containing a material proportion of starch are not helped by hot extraction because the heat gelatinizes the starch and makes the drug impermeable. This was proved especially on ipecac.

3. Cinchona, a drug which contains much tannoid matter and a drug which needs hydrochloric acid for the rapid extraction of its alkaloids, has its tannoid bodies changed to phlobaphenes by the action of the hot hydrochloric acid solution, and the drug then clogs and refuses to allow the menstruum to pass through it. Heat hinders rather than favors extraction in this case.

4. Physostigma, which needs a highly alcoholic menstruum, is helped some by hot extraction. But quite as good results are obtained in this case by cold percolation through a finer powder, and by the use of more acid menstrua. For strongly alcoholic menstrua finer powders are needed in all cases than for aqueous menstrua and the heat is likely to induce loss of menstruum which will offset economy in percolate.

5. In general hot extraction is better applied when aqueous menstrua are used and coarser powders employed. It is likely to be inapplicable to starchy drugs because of the gelatinizing of the starch and the hindrance to penetration of the drug by the hot menstruum by this action. Drugs containing albuminous matters give clearer and more stable preparations by hot extraction.

LABORATORY OF
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FLUIDEXTRACT OF ERGOT.*

BY J. P. SNYDER.

There is probably no fluid extract at present official in the U. S. P. which is so generally used by physicians as Fluidextract of Ergot. Its preparation requires rigid control and careful standardization in order to insure therapeutic activity, and while the directions in the present U. S. P. are no doubt adequate to take care of this requirement, the finished fluid extract has been criticized from two angles. The U. S. P. VIII directed that the fluid extract be prepared with a menstruum of diluted alcohol acidulated with acetic acid which was changed in the 9th revision to diluted alcohol and hydrochloric acid. I am unfamiliar with the reasons for this change and it would be of little consequence if it were not for a decided different odor of the preparation when the hydrochloric acid is used.

Many physicians have become accustomed to the odor of the fluid extract in which the acetic acid was used and the change has led to many inquiries concerning the causes.

As far as I can personally learn the therapeutic activity of the fluid extract is not affected by the change and it is doubtful if a return in the U. S. P. X to the former menstruum would serve any useful purpose since we would simply reverse the condition and those who are now familiar with the odor of the preparation official in the U. S. P. IX would immediately notice the difference.

The only reason for mentioning it in this paper is to point out how slight changes in the long-used official preparation may excite suspicion in the minds of the physicians and lead to comments.

The second difficulty is one which everyone who has attempted to produce a fluid extract of Ergot has experienced, namely, precipitation. So pronounced has been this condition in certain lots that it was decided to investigate the situation and if possible devise some means of overcoming the difficulty.

One of the first points of interest in referring to the U. S. P. is the difference in the manufacturing process of Fluidextract of Ergot and Extract of Ergot. Under Extract of Ergot we find the direction reads, to remove the fats from the ground drug by first percolating with purified petroleum benzene, while in case of the fluid extract it states to percolate direct with the menstruum. This suggests the possibility that the fats normally found in Ergot may be the cause of the precipitation and accordingly the ether extractive of several different samples of Ergot was determined, which indicate that fats are contained in Ergot in from 18 to 28% which shows that these fats are there in no small quantities.

With this information at hand it was decided to prepare three fluid extracts from the same lot of drug as follows:

1. By the U. S. P. method.

2. By the U. S. P. method defatting after completion by agitation while warm with melted paraffin and making up to volume with diluted alcohol.

3. By defatting the drug by percolation with carbon tetrachloride or petroleum benzene dissipating the solvent from the drug by exposing it to the air and converting the resulting defatted drug into fluid extract by the U. S. P. process.

After the preparation of the fluid extracts, they were to be examined with these points in mind.

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* Scientific Section, A. Ph. A., Cleveland meeting, 1922.

1. Does the removal of the fats from the fluid extract of Ergot improve the physical appearance of the preparation?

2. What is the relative amount of precipitate found in fluid extract of Ergot from which the fats have been eliminated in comparison with that made by the U. S. P. process?

3. Which is the more advantageous method for removal of the fats, the use of an immiscible solvent such as carbon tetrachloride or petroleum benzene, or the paraffin method?

4. Do the fats normally found in Ergot possess any therapeutic activity?

5. What effect does the removal of the fats have upon the deterioration of fluid extracts of Ergot?

It was thought advisable to eliminate at once the petroleum benzene from the experiments as the fire hazard is entirely too great to permit using this liquid in large quantities, particularly as it is necessary to spread the defatted drug over a considerable area in order to volatilize the petroleum benzene.

Immediately after completion the three fluid extracts were tested by the blood pressure method with these results:

1. U. S. P. fluid extract gave a rise of 18 mm. when injected into the femoral vein of a dog in dose of 0.04 cc per Kg. weight of dog.

2. U. S. P. fluid extract of Ergot defatted with melted paraffin gave a rise of 16 mm.

3. Fluid extract of Ergot manufactured with drug defatted with carbon tetrachloride gave a rise of 19 mm.

The standard which we have adopted at our Laboratory for fluid extract of Ergot is that when injected into the femoral vein of a dog in dose of 0.04 cc per Kg. weight of dog it is required to give a rise of not less than 16 mm.; therefore, all three fluid extracts were found to meet this requirement. In fact there is very little difference between them. The one made by defatting with paraffin gave slightly lower results and as heat is very destructive to Ergot the temperature necessary to keep the paraffin melted during the defatting process may have had this slight effect.

Five hundred cc of each of the fluid extracts were transferred to cylinders of that capacity and after standing one month the fluid extract made by the U. S. P. process and that prepared by defatting with paraffin both showed a decided precipitation, while the one made by first defatting the drug with Carbon Tetrachloride is entirely free from precipitate.

After standing six months that produced by the U. S. P. process showed decided precipitate while that defatted with melted paraffin contained almost as much. Fluid extract manufactured from drug defatted with carbon tetrachloride contained only a slight film of precipitate. From the standpoint of physical examination, the latter was considered highly satisfactory, while the former two were felt to contain entirely too much precipitate.

To determine if any of the fluid extracts had deteriorated to any appreciable extent they were tested after they had stood four months again by the blood pressure method with these results:

1. The U. S. P. fluid extract gave a rise of 17 mm.

2. Defatted with paraffin gave a rise of 16 mm.

3. Prepared from drug defatted with carbon tetrachloride gave a rise of 18 mm.

CONCLUSIONS.

From the results of these experiments I find that

1. Defatting the drug with carbon tetrachloride overcomes the precipitation difficulty.

2. That defatting the drug with carbon tetrachloride is far preferable to the use of paraffin as a defatting agent.

3. That removal of the fats from the fluid extract does not affect its therapeutic activity.

4. That the removal of the fats from the fluid extract does not hasten the deterioration of the preparation.

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STAINLESS STEELS IN THE DRUG STORE.*

BY F. J. BLUMENSCHEIN.

Stainless steel developed by Dr. C. M. Johnston, Director of Research of the Crucible Steel Co., is defined as—Rustless, Stainless, and Acid-resisting Steel.

It differs from ordinary stainless steels in a number of particulars, its special resistance qualities are contributed by using three resisting elements in addition to iron, while the stainless steels usually contain only one resisting element—chromium. The steel under consideration contains chromium, nickel and another special alloying metal along with iron, carbon, etc.

Stainless steel, to be made stainless, must be heated in an electric furnace to about 1500° C. and cooled or tempered in oil and the coating of oxides removed by polishing; it becomes very hard and takes a keen edge after the heat treatment. In the annealed condition it is not stainless but it must be annealed to be worked.

This special steel on the other hand requires no heat treatment to render it stainless and acid-resisting; however, it must first be polished to remove the oxides; thereafter, no further polishing is required, as it will not rust or tarnish.

Stainless steel is not entirely stainless; in time it becomes colored but it does not rust, as we ordinarily think of rust.

A number of different alloys are being manufactured and sold under the general titles of stainless steel or rustless steel—without regard to the nature of the alloying metal, whether it be nickel or chromium or other metal conferring similar properties to the alloy. In many cases these steels are fabricated without thought being given to some of the uses that manufactured articles of this product are employed in or used for.

This steel is made in many grades, each grade being designed for some particular class of manufacture. It can be stamped, drawn, cast or machined, etc., into almost any form possible for iron, brass, steel or Monel metal. The metal parts of soda fountains could all be made from stainless steel—drain board, sink,

* Read before Section on Practical Pharmacy and Dispensing, A. Ph. A., Cleveland meeting, 1922.

cooler, pipes, draft arms, etc. These would last longer than an average lifetime, as no polishing would be required after the first factory polishing; none of the acids, organic or inorganic, which are used at soda fountains have any appreciable effect upon it. If such a fountain should cost a thousand dollars more than the one containing brass, silver, block tin, etc., the cost of labor in daily polishing would soon make up such extra cost and there would be no repairs necessary.

The metal parts of balances and weights could be made from this metal, which remains permanently bright.

Spatulas of some varieties of stainless steel on the market have changed color while in stock in the wholesale drug houses; this is probably due to improper heat treatment, or the use of an alloy unsuited to such purpose.

Ointment boxes, suppository moulds, tablet triturate moulds, large and small pans, retort stands and rings and, in fact, practically all utensils now used which are made of iron, tin, aluminum, brass, steel, etc., could be replaced by stainless steel. Citric and lactic acids, in all concentrations, have no effect upon it. Phenol, salicylic acid, mercuric oxide, ammoniated mercury, concentrated ammonium sulphide are not affected nor do they act upon the metal. Saturated solution of mercuric chloride and tincture of iodine will react, producing marks which can be removed.[1] Wire may be imbedded in glass in a similar manner to platinum.

ABSTRACT OF DISCUSSION.

The author was asked relative to the price of the alloy. He was not informed, but stated that the price was about the same as that of aluminum. Asked whether the alloy was attacked by the mercury in mercurial ointment, reference being made to its manufacture into ointment boxes, the author replied in the negative.

MIXTUM COMPOSITUM.*

BY OTTO RAUBENHEIMER.

Mixtum Compositum, a medley, a chaos, a mischmasch, an "everything together," is the named used in pharmaceutical parlance, at least in my store, for a polypharmacal mixture, especially such a one as contains one or more incompatibilities. The subject of incompatibilities should be given much more attention in colleges and at pharmaceutical meetings. In his daily routine a good prescription pharmacist has quite a number to deal with. From the abundance of incompatible prescriptions at my disposal I have thus far compiled a number of files for two colleges, namely, the prescription department of the University of the State of New Jersey and the New Jersey College of Pharmacy. From that supply I also started the Department of Prescription Difficulties in *The Practical Druggist* in 1912. Still they are coming, and I will select at least one, perhaps the worst of the lot, the one containing the most ingredients and the most incompatibilities, for discussion at the Section of Practical Pharmacy and Dispensing—*the* Section for the retail pharmacist. Here is the Mixtum Compositum:

[1] Specimens were submitted by the author—they had all been subjected to acids and alkalies and many reagents; a stained piece showed the effect of mercuric chloride, as stated in the last paragraph of the paper.

* Read before Section on Practical Pharmacy and Dispensing, A. Ph. A., Cleveland meeting, 1922.

℞ Tinct. Digital.
Tinct. Nux Vom.
Flext. Cascara aa ʒ ii
Tinct. Cinch. Co.
Tinct. Gentian Co.
Essent. Pepsin aa ʒ iv
Mist Rhei et Sod. ʒ ii
Elix. I. Q. & S. q. s. ad ʒ vi

Verily polypharmacal! This 6-ounce mixture contains 8 preparations or 26 single ingredients. Surely if one of these fails to help, one of the many others may do some good. This prescription contains at least two chief incompatibilities, besides a number of less important ones.

1. The iron citrochloride in the elixir will form black iron tannate (ink) with the tannin containing tinctures and rhubarb and soda mixture. Be it remembered that the tannin in compound tincture of gentian is not due to the gentian but to the bitter orange peel and cardamom seed.

2. The acid fluidextract, tinctures, elixir, and quite especially the acid essence of pepsin cause a lively evolution of CO_2 with the sodium bicarbonate in the rhubarb and soda mixture. This must be allowed to escape. As a further precaution it is advisable to dispense this 6-ounce mixture in an 8-ounce bottle, so as to allow room for the evolved gas.

Is there any method or manipulation whereby these incompatibilities can be avoided without altering the therapeutic action of the medicine? In my opinion there is none. I had occasion to compound this prescription about 25 times, being renewed that often, but found it was immaterial how the ingredients were mixed together. The result was always the same, namely, iron tannate and CO_2.

Of course it is understood that such a "Mixtum Compositum" is to be dispensed with a "Shake Well" label. The student or somewhat inexperienced pharmacist need not worry about such incompatibilities.

Fortunately, very fortunately, such polypharmacal and incompatible prescriptions are gradually disappearing in the up-to-date medical practice.

THE USE OF AN INDICATOR IN THE COMPOUNDING OF A POWDER PRESCRIPTION.

BY CHARLES A. GREENSTONE.

Does there seem any good reason why an indicator should not be used in the compounding of a prescription containing all white powders? Does there seem any good reason why an indicator, under these circumstances, should not be made use of just as one is used in a chemical analysis? Does the thought seem worthy of consideration? If so, let me briefly report on the results of some of my investigations.

Powders may be prescribed in the form of chartulae, capsules, or in bulk. The indicator used in chemistry shows when the solution has been titrated sufficiently, whereas the one used in pharmacy demonstrates when the powders have been intimately mixed. In either case, the indicator is a "means to an end" and as such is indispensable.

The indicator which I have been using and to my complete satisfaction, I may add, is *pulvis aromaticus*, U. S. P. The color of this powder, brown, makes this preparation a very good indicator, and it will show distinctly just when the powders in a prescription are thoroughly mixed, this point being—in the compounding of a powder prescription—when no white streaks appear in the mixture.

In order to be able to carry on my experimentation with practical examples, I obtained the permission of several physicians to use the aforementioned indicator, explaining that it is very difficult to note when white powders are intimately mixed.

Aromatic powder U. S. P. is a carminative and therefore would hardly interfere with the action of the other ingredients of a prescription. This fact was confirmed by the physicians and, when once convinced, they readily gave their consent to my continued experiments. In any event, the amount of indicator used was seldom more than three (3) grains per drachm of powder and its action was thus rendered practically negligible.

The following prescriptions drawn from my files will serve as a general illustration of the use, as well as the usefulness, of an indicator:

℞ Example No. 1.

Santonin		
Hydrarg. chlor. mit.	of each	1 grain
Sach. lact.		30 grains
Pulv. aromat.		2 grains
for 6 powders		
Directions		

℞ Example No. 2.

Arsen. triox.		
Strych. sulph.	of each	1 grain
Quin. sulph.		10 grains
Sach. lact.		2 drachms
Pulv. aromat.		6 grains
for 30 capsules		

℞ Example No. 3.

Mag. oxid.		5 drachms
Cerii. oxal.		1 drachm
Sod. bicarb.		
Bism. subcarb.	of each	4 drachms
Pulv. aromat.		14 grains
A powder.	The dose directed—one-half teaspoonful	

In Example No. 3, I found one (1) grain per drachm of powder to be sufficient for an indicator for practical purposes and, still, not too much to interfere with the action of the other ingredients of the prescription.

In Examples Nos. 1 and 2, we find the presence of some potent ingredients. Just such prescriptions as these prompted me to carry on my experimentation. These are the kind which should be carefully triturated in order to obtain the proper amount per dose prescribed.

There are other indicators which could be used in place of *pulvis aromaticus*, U. S. P., such as powdered licorice, powdered rhubarb, powdered fennel, etc. The fact to bear in mind, however, is to choose an indicator which will not materially interfere with the action of the medicine.

In conclusion, I wish to state that the use of an indicator in the compounding of a powder prescription should be brought to the attention of all physicians. It might be deemed advisable to refer the paper to the U. S. P. Revision Committee.

HISTORY OF THE APOTHECARY SHOP: A BIBLIOGRAPHY.*

BY EDWARD KREMERS.

No. 4. The Apothecary Shop of Castle Issogne.

In like manner as one of the mural paintings of the *Casa dei Vettii* affords us a glimpse into the activities of a Roman precursor to the modern apothecary as he plied his trade at the very beginning of the Christian era, so a mural painting of Castle Issogne affords a glimpse into the "*bottega*"[1] of the "*confectionarus*" or "*stationarius*," *i. e.*, the apothecary of the Italian *quattrocento*, the early renaissance. This glimpse is all the more interesting and valuable because it takes us back to the time shortly after Emperor Frederick II had announced his famous "edict of 1224," whereby pharmacy was made a distinct profession. The Italian apothecary thus became the prototype for the representative of the countries north of the Alps. It was in Italy that the better class of early apothecaries were educated. It was from Italy, whose cities on the Adriatic and Mediterranean maintained direct commercial connection with the Orient, that the ultramontane countries obtained not only the costly spices and aromatics, but some of the most highly cherished galenical preparations, notably the theriac.

The *Castillo d'Issogne* lies in the *Valle d'Aosta* on the right shore of the Dora or Doire, which has its two-fold origin on St. Bernhard and Mont Blanc, respectively, and which empties into the river Po below Turin. The nearest community is the *borgo di Verres*, a small market town. Not far away is the Castle Challant to the owners of which Castle Issogne also belonged. The latter now belongs to Vittorio Avando, a collector of antiquities.

The builder of Issogne was Giorgo di Challant. The date of his birth is unknown. In 1485 he was a student of law. Later he occupied several clerical positions. He died as governor of the Aorto Valley, Dec. 30, 1509. The castle was built by him about the year 1490.

The *Castello* was constructed as a palace rather than as a fortified castle, being without wall, moat and other devices of defense. The building as such, as well as its interior arrangement and decorations, represents the transition stage between the rigid Gothic and the more exuberant renaissance style. For a description of the building and its interior, the reader is referred to the works of Forrer[2] and of Avando and Giacosa[3]—the former being based on the latter—to which the writer is indebted for description as well as photographic reproduction of the mural painting of the apothecary shop.

The frescoes of special interest are found in the arched wall space of the cloister on the ground floor of the castle above the wood panels. The lower portion of each painting is disfigured with names of visitors. The frescoes represent (1) a grocery store; (2) an apothecary shop; (3) a tailor's shop and booth for the sale of cloth; (4) a market scene; and (5) a scene in a military barracks.

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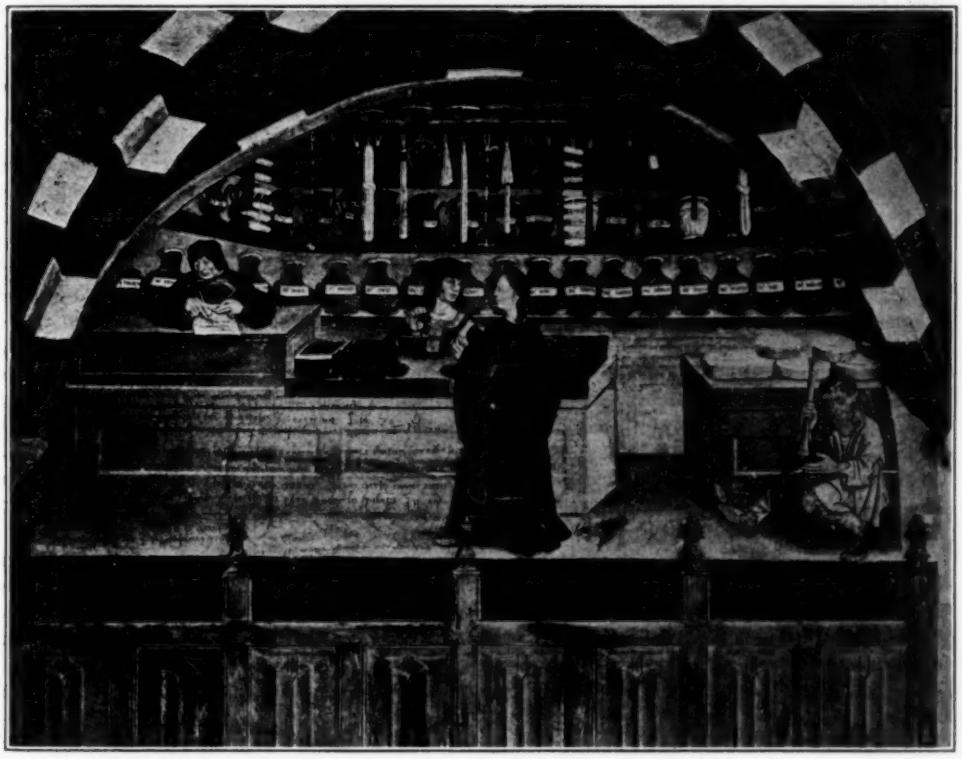
* Section on Historical Pharmacy, A. Ph. A., Cleveland meeting, 1922.

[1] Italian for *boutique*, both Romance corruptions of the Lat. *apotheca*, the Greek *apotheke*.

[2] R. Forrer, "Spaetgothische Wohnraeume und Wandmalereien aus Schloss Issogne." Mit 12 Lichtdrucktafeln. Verlag von Fritz Schlesier in Strassburg i. E., 1896.

[3] Vittorio Avondo Giuseppe Giacosa, "Notizie storiche intorno la famiglia di Challant." (with 20 photographic reproductions.) Torino, Tip. Lect. Camilla E. Bortoloro.

The description of the apothecary shop is herewith given, both in the original of Forrer and a rather literal translation by the writer.



The Apothecary Shop of Castle Issogne.

Whether the following comment on Forrer's description is called for the reader may judge for himself.

"Hinter dem erhoehten Pulte links sitzt der Arzt und rechnet.

Im Mittelalter war der Arzt zugleich auch Apotheker, und es kann uns seine Anwesenheit daher hier nicht befremden. Der weite Mantel und die tief die Ohren bedeckende Muetze sind sein characteristisches, auch in den Miniaturen des XV und in den Holzschnitten des XVI Jahrhunderts immer wiederkehrendes Costuem. Rechts von ihm waegt der Provisor einer eben hinzugetretenen Dame das verlangte Medicament oder die gewuenschte Spezerei vor. Schachteln, welche neben ihm auf dem Tische stehen, enthalten irgendwelche besonders oft verlangte Dinge fuer Mund und Magen. Rechts ist ein alter Mann mit zerlumptem Gewande beschaeftigt, in einem Moerser mit maechtigem Stoessel etwas Hartes zu zerkleinern.

Behind the raised desk sits a physician[1] who is figuring.

During the middle ages the physician was also apothecary, hence his presence in the apothecary shop is to be expected. The flowing robe with the cap that covers the ears are his characteristic costume, such as may repeatedly be seen in miniatures of the fifteenth century also in wood cuts of the sixteenth century. To the right of the physician the assistant weighs out a medicament or spice for the lady who has just stepped into the booth. The boxes which rest on the counter next to the assistant contain such articles as are more frequently demanded for mouth and stomach. To the right an old man in ragged garb is occupied with comminuting something hard in a mortar with a mighty pestle.

Laengs der Rueckwand ruhen auf starken Holzgestellen zahlreiche Apothekergefaesse mit gothischen Inschriftzeddeln, welche uns ueber den Inhalt Aufschluss geben. Die untere Reihe enthaelt allerlei wohlthaetige Waesser, darunter *aq melisse* und *aq absinctis* noch heute nicht vergessen sind. Die oberen Regale zeigen bemalte Toepfe und Kannen verschiedensten Inhaltes.

Von der Gewoelbedecke herab haengen Dinge, die zum Theil nur schwer bestimmbar sind, und Andere, die wir heute bei einem Apotheker nicht mehr suchen: Lange Kerzen, runde verzierte Kuchen, Zuckerbrode u. dgl. m. Damit harmonirt der Inhalt der auf dem schameln Pulte rechts ausgestellten Schachteln mit Datteln und candirten Fruechten, wie sie das Mittelalter als Leckerbissen liebte, und wie sie noch heute eine Specialitaet der itelienischen Zuckerbaecker bilden. Die runden und ovalen Holzschachteln sind mit zierlich ausgezacktem Papier ausgelegt, ganz wie noch heute die aus Italien kommenden Dosen mit candirten Suedfruechten innen ausgestattet sind!

Auf den obersten Regalen der Hinterwand ruhen zahlreiche geschlossene Schalteln, unter deren Deckeln dasselbe ausgeschnittene Papier hervorlugt, und die einen gleichen Inhalt vermuthen lassen. Man sieht, die Apotheken jener Zeit standen in Bezug auf die Vielgestaltigkeit der Dinge, an denen sie was verdienen wollten, unseren heutigen nicht nach.

Dass sie ebenso theuer wie die heutigen waren, moechte man beinahe aus der ansehnlichen Groesse des Geldstueckes schliessen, das die Kaeuferin dem Provisor mit erstauntem Geschicht entegegenstreckt.

In the rear, on heavy shelving, are numerous pharmaceutical containers, the gothic labels of which reveal their content. On the lower shelf[2] are found all sorts of medicinal waters, such as *aqa melisse* and *aqa absinctis* which are known even to-day. The upper shelves reveal painted pots and cans with a variety of contents.

From the arched ceiling there are suspended a number of articles only a few of which can be identified with difficulty;[3] also others that we no longer seek in an apothecary shop, such as long candles, round decorated cakes, sugared bread, etc. In harmony with these are the contents of boxes:[4] dates and candied fruits exhibited on the small desk to the right. These were much liked as delicacies during the middle ages and are to-day a specialty of Italian confectioners. The round and oval wooden boxes are lined with white paper with fringed borders, like the boxes imported at the present time from Italy, with candied, semitropical fruits.

On the highest shelves of the rear wall are numerous closed boxes from under the covers of which the same kind of fringed paper projects and which presumably contain the same delicacies. It becomes apparent that the apothecary shops of that period did not take a back seat to our own with regard to the multiplicity of objects with which they wanted to make a living.

That they were as high priced as those of to-day may possibly be inferred from the appreciable size of the coin which the purchaser, with a surprised expression, offers to the assistant.

1. Forrer expresses the opinion that the person who is writing or "figuring" is a physician and gives his reason for this view. In this connection, however, two things should be remembered. First, that, in accordance with the edict of Frederick II, all commercial relation between the physician and the newly created apothecary was strictly forbidden. It is possibly because of this regulation that Schelenz* regards him as the master apothecary or "chef" and the person with the balance as the "Provisor," *i. e.*, the first assistant or prescriptionist. To what extent the edict of Frederick II was enforced in the numerous petty states of what we now call Italy, does not appear to be known. Moreover, what is commonly referred to as the Edict of 1224 is said by historians to be a collection of edicts and ordinances issued over a long period. It is, therefore, an open question, not only whether the particular edict forbidding physician and apothecary to make common cause was in force, but also whether it is, in reality, as old as sometimes assumed. After all, therefore, Forrer may be correct in his assumption.

* "Geschichte der Pharmacie," p. 382.

Secondly, attention should be directed to the rule in certain cities compelling the physician to write his prescription in a book kept for this purpose in the apothecary shop. It is possibly because of this rule that one sees the physician in so many pictures of apothecary shops writing prescriptions. Thus while Forrer's interpretation of the person behind the writing desk as physician may be correct, his interpretation regarding the physician as owner of the shop may nevertheless be wrong.

2. The labels of the containers on the lower shelf, from left to right, read as follows:

1. *Aqboragii* = *Aqua Boragii*
2. *Aq rosar* = *Aqua rosarum*
3. *Aq^a plata* =
4. *Aq^a violar* = *Aqua violarum*
5. *Aq^a bugolose* =
6. *Aq^a melise* = *Aqua Melissae*
7. *Aq^a s----* =
8. *----bsinci* = *Aqua absinthii*
9. *Aq^a zute* =
10. *Aq^a lihazii*
11. *Aq^a cunozie*
12. *Aq^a betonice* = *Aqua Betonicae*
13. *Aq^a fenicul* = *Aqua foeniculi*
14. *Aq^a berberic* = *Aqua berberis*(?)
15. *Aq^a vite* = *Aqua vitæ*
16. *Aq^a valeria* = *Aqua valerianae*
17. *Aq^a*

It is very apparent from the above list that the aromatic waters, these precursors to the volatile oils, had begun to play their important rôle as representing the quintessence of the drugs from which they were distilled.

The labels on the containers in the upper row are even more difficult to decipher. Again from left to right, the following may be read:

1. *O. R* =
2. *C* = *Confectio*
3. *O.* =
4. *Acite* = *Acetum*
5. *Aqa S* = *Aqua S*
6. *----sen* =
7. *O-All* =
8. *O* =
9. *----Ric* =
10. *C Rosata* = *Confectio rosata*
11. *C. Olive* = *Confectio olivæ*
12. *C. Rosr.* = *Confectio rosarum*
13. *C. pomic* =

The number of confections on the upper shelf as well as the boxes with (presumably) candied fruit on the counter would seem in harmony with the designation *confectionarius*, by which name the Italian apothecary of the early renaissance was known, were it not for the fact that the term was used to designate other makers than those of candied fruit as well.

No claim is made, in each instance, for the correctness of the labels where the attempt has been made to decipher them with a magnifying glass. It is to be hoped that some Italian apothecary may some day prepare a list of titles from the originals, if this has not already been done.

3. Concerning the articles suspended from the ceiling, Schelenz regards them as "probably" being "cakes of wax, roots strung on strings, queer drugs and wax candles." Without an actual inventory of an Italian apothecary shop of this period, it may be useless to speculate as to who is more likely correct, Forrer or Schelenz.

4. Of the "Spanschachteln," Schelenz† states that up to the middle of the 19th century, they were used almost exclusively for packing "confects, dry medicaments and ointments."

Of further interest is the fresco representing a market scene with two booths in the background. Both of these booths open upon the market, the entire front being removed during business hours.

THE MODERN TOWER OF BABEL.*

BY ROBERT S. LEHMAN.

Some 6000 years ago, sacred history tells us, the inhabitants of the then-known world, who lived in the fertile valley of Mesopotamia, began the erection of a monumental temple of great height in honor of the pagan god Baal. This was known as the Tower of Babel.

As they were progressing with their task, the great Jehovah, who would brook no other gods beside himself, caused these misguided workers to be stricken with a malady, which rendered them unable to understand each other's language; in other words, he created a confusion of tongues.

At the present time, a similar transition is in progress, but of a reversed order. In other words, in the modern Tower of Babel, which is our wonderful City of New York, folk of all tongues flock together and are gradually being converted into a people speaking a common language, which we trust and hope will be raised in praise and reverence of the great Jehovah.

That this process is a laborious and slow one, goes without saying, for many of those who have come from foreign lands to establish a new home on our shores have passed the age when the elasticity of their intellect will permit them to acquire the language of their adopted country. So, naturally, they flock together in the sections where the people of their race and tongue congregate and sometimes even fear to venture outside of the confines of their district.

The youthful members of these colonies are more fortunately situated, for thanks to our excellent public school system, they soon acquire the English language, and, I am sorry to say, often forget or ignore the tongue of their forefathers.

Those of middle age, who are obliged to be the bread-winners of the older and younger members of their families, are forced to learn the common language, as a matter of sheer necessity, as otherwise they would soon be submerged in the relentless struggle for their daily bread.

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† "Geschichte der Pharmacie," p. 382.

* Read before New York Branch, A. Ph. A., January meeting, 1923.

The most numerous group of the peoples undergoing transformation in this melting-pot of ours is the Hebrew or Yiddish. This division is more racial than national, as their homelands embraced portions of various countries in Eastern Europe, namely, Russian Poland, Russia proper, Galicia in Austria and Roumania. Besides the languages of these various countries, they speak the Yiddish dialect, which is simply an archaic German, similar to the language spoken in Germany in the 16th century, modified by idioms acquired in the countries in which they lived before coming to America.

The bulk of their immigration dates from the late 80's, when the persecution of the Jews by their Russian fellow subjects forced them to seek new homes across the seas.

Their industrial activities extend into various lines, professional, commercial and manufacturing. The total number who admit speaking the dialect is, according to the census of 1920, 946,000.

The next largest group of foreign-born residents of the City of New York are the English-Irish-Scotch, emanating from the British Isles. Of these there are, according to the census, 897,000. However this paper will not consider them as they speak the language of the country and are soon undistinguishable from the rest of the native-born population.

The third group in point of numbers is the Italian, which the census places at 803,000. The great influx of the sons and daughters of sunny Italy dates back to the end of the Civil War, when the reconstruction of our country required the services of a large number of hardy and industrious laborers, and the rewards of this labor having proved so satisfactory, soon many of the more educated classes were attracted to this country. The result has been that at the present time the Italian race composes a goodly proportion of the population of the United States, and its sons have entered all fields of industrial and professional endeavor.

The fourth group, according to the census, is the German, of which 690,000 admit the ability to speak the tongue of their fathers. I am inclined to question the accuracy of these figures, for there is no doubt that the descendants of the German immigrants who came here between the years 1840 and 1914 number more than a million and a large proportion are able to speak the German language more or less perfectly. As indicated before, German immigration received its great impetus between the years of 1840 and 1860, when the political and economic conditions in Germany, with its innumerable petty states, became unbearable to many of its most enlightened inhabitants, and after an ineffectual attempt to establish a republic or at least a liberal constitutional empire in 1848, by means of a popular revolution, men and women of all classes left the shores of the Fatherland for a new home in America, where their descendants have been successful in practically every branch of professional, industrial and commercial life.

The fifth linguistic group is the Russian, which claims 221,000. These figures must include Russian-speaking Hebrews, who are also enumerated in the Yiddish group, as the number of Muscovite Russians in New York will be much less than the figures indicate. The Russian immigrants in this part of the world hardly include any of the bourgeois class of the home country, as that group before the world war was too small and prosperous to emigrate, so that those who have made their home here either belong to the laboring classes or the professions, especially of music and art.

The sixth group is the Polish, numbering 161,000. These came from Russian Poland, Galicia in Austria and the Polish-speaking provinces of Prussia, now all included in the Republic of Poland. These have been emigrating to the United States steadily since the Civil War, for similar reasons as those which actuated the Italians, as the conditions were attractive for hardy and industrious laborors.

Of the groups of less than 100,000, there are the Magyar or Hungarian, with 76,000; the Swedish, 60,000; the Norwegian, 40,000; Spanish, 32,000; Roumanian, 26,000 (greater part of which may also be included in the Yiddish class); Greek, 25,000; Czechs, 25,000; Slovaks, 15,000; Finlanders, 12,000; Armenians, 10,000; French, 10,000; Danish, 10,000; and the smaller groups, including the Albanians, Syrians, Chinese, Croatians, Japanese, Lithuanians, Persians, Portuguese, Ruthenians, Serbians, Slovenians and Ukrainians (which latter class may perhaps be enumerated among the Russians).

In the year 1919, there were published in the City of New York, foreign language newspapers and magazines to the number of 165, as follows:

Albanian	2	Greek	8	Roumanian	1
Arabian	8	Hebrew	3	Russian	7
Armenian	2	Hungarian	8	Serbian	3
Bohemian	8	Italian	17	Slovak	4
Chinese	2	Japanese	2	Slovenian	2
Croatian	3	Lithuanian	4	Spanish	19
Finnish	2	Norwegian-Danish	2	Swedish	3
French	6	Persian	1	Ukrainian	1
German	17	Polish	6	Yiddish	23
		Portuguese	1		

These conditions certainly make New York the most polyglot and cosmopolitan community of the globe, and the merchant and business-man, especially the retail pharmacist, should recognize this fact. Those established in sections included or contiguous to the districts inhabited by these foreign-speaking peoples, should endeavor to obtain at least a working acquaintance with the languages spoken, if they wish to hold their ground. My own experience has shown that the old folks among them, who are unable to learn English, are very grateful to native-born Americans who try to understand and speak to them in their own vernacular, even though the vocabulary be limited and the syntax somewhat ungrammatical. In fact, I have discovered that they will gladly patronize stores where the American proprietor and his employees show respect for the language by attempting to acquire it.

It is also our duty as citizens to set a good example to the new-comers in our midst and to conduct ourselves in such a manner as to inculcate respect and admiration for the republican institutions of our country. We must show them that obedience to the law can be voluntary and by consent of the governed, and must not necessarily be backed by the armed forces of the state. By sustaining these principles, we will convert our foreign-born population into good and patriotic American citizens.

However, as stated before, the public school for the children and the necessity for the mature element to go out into the world of pitiless competition to acquire a living for themselves and their families, soon show the necessity of acquiring the language of our country.

So our modern Tower of Babel is causing the transition from a "confusion of tongues" to a single language, spoken and understood by all, and is tending to hasten the millenium when the brotherhood of all mankind will finally be recognized and "swords will be beaten into ploughshares" for all time.

THE BUSINESS SIDE OF PHARMACY

This department is devoted to the discussion of problems of business administration and commercial policies relating to the various branches of pharmacy.

CONDUCTED BY DR. ROBERT P. FISCHELIS.*

"The greatest business asset of a modern pharmacy is a well-conducted prescription and drug department." This is not the statement of a theorist or of one whose intense interest in scientific pharmacy leads him to minimize the importance of the drug store as a distributing station for merchandise that is not allied to pharmaceuticals—even distantly. It is the statement, in substance, of a successful director of one of the largest drug stores in the third largest city of the United States. He knows whereof he speaks from many years of daily experience in an establishment that has served the public in practically one location for sixty-five years.

In a paper read before the Section of Commercial Interests of the American Pharmaceutical Association at Cleveland, he reminded those who are engaged in the retail drug business that there is such a thing as keeping step with the advancing times without losing step with certain firmly set professional principles that are as old as pharmacy itself and which none who are in the drug business to-day can afford to ignore. The key-note of the only sane policy for the retail drug store of to-day is to keep the prescription department the heart of the business.

Can and does the prescription department pay? It certainly can, but whether it does or not depends on the man who is running it. Modern business takes it for granted that no service is rendered and no goods are sold without a direct profit although such a direct profit may at times come to the business man by indirect means. We have been treated from time to time with newspaper articles charging pharmacists with profiteering on prescriptions because the person who preferred the charges found out that ingredients of a prescription can sometimes be purchased individually at a low price which to his mind was all out of proportion to the charge made by the apothecary for the finished product. If the same type of reasoning were followed in arriving at the proper charges for anything else besides prescriptions, every business man would by the same token be a profiteer.

The general attitude of pharmacists who seek to avoid charges of profiteering by making prescription prices ridiculously low, is to be deplored. Any department that is to retain the interest of the druggist and receive a large share of his attention must be profitable. When druggists shake their heads in despair and give voice to their disgust by saying that they wish they could get rid of their prescription departments entirely because they do not pay, they are beginning to follow the line of least resistance and they discourage the most vital part of the drug store's work.

If, on the other hand, the figures show that the prescription department is

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* Dean, New Jersey College of Pharmacy.

not paying its way and the pharmacist decides to find out the reason why and goes over the cost and receipt figures carefully and finds that it is because he has not kept his charges for professional work up to the ratio which will yield a fair profit and he proceeds to correct that condition by making proper charges for his professional services, he is putting his store on a decent, high-grade, professional service plane which will undoubtedly result in financial success.

People as a whole realize that professional service cannot be rendered cheaply and they immediately suspect the man who is "cheap."

There ought to be a better understanding of the costs of compounding, including clerk hire, overhead and other factors which every business man includes in the cost of his goods, and it would not be at all amiss to let the public see such figures so that the profiteering charge that is sometimes hurled at the drug store may be boldly and completely refuted. The cost of the ingredients is all that some pharmacists consider as definite in figuring the cost of a prescription. Then they add a figure to the cost which they think will cover other factors and yield a profit. This is purely guess work and is arrived at largely by the quantity of the prescription, its nature and possibly the amount of time consumed in compounding it. No other class of business men would arrive at the selling price of a commodity or a service in that way. It is very unbusiness-like, careless, haphazard and indeed it may well lead to overcharging as well as undercharging.

The only corrective for this condition is a thorough study of the cost factors and what constitutes a legitimate profit. This is a subject that should be discussed at some length by pharmaceutical organizations everywhere in order that a fairly uniform and sufficiently high scale of prices may be arrived at.

Cost factors that should be discussed in making up a fair prescription price schedule should include the cost of ingredients, a fair profit on the ingredients, cost of container, a proportion of the overhead of the store which should be a fixed amount to cover rent, light, heat, salaries, etc., a compounding fee including proper checking of ingredients and based on the time of all persons involved, a fee to cover packaging and delivery and finally a service charge to cover special record keeping, reports, etc.

No salesman whether he sells goods or service can have any confidence in his prices unless he knows costs. It is such knowledge which makes it possible for him to refute false accusations as to alleged profits, and allows him to meet his customer in a straightforward manner inviting a discussion of his costs and explaining the necessity for the details of service when the situation calls for such discussion. Furthermore such knowledge properly displayed at the right time by the salesman, in this case the pharmacist, inspires his customer with confidence in his ability, judgment and fairness.

Certainly this question of proper charges for prescription work is one of the most important to which the thought of pharmacists could be directed at this time, and doubtless a proper financial reward for this portion of the drug business will stimulate interest in the professional side of the calling. At the present time the apathy of some pharmacists toward the pharmaceutical end of their business constitutes one of the chief menaces to progress in the professional side of the retail drug business. Possibly a full consideration of the problem of prescription pricing holds a remedy for this apathy.

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THE JENNER CENTENARY.

Dr. Edward Jenner died January 26, 1823. A commemorative exhibition was opened at the Wellcome Historical Museum and will remain open for about six months. While the efficacy of vaccination was known in eastern countries a century or more before the time of Jenner, he perfected the practice through his rediscovery of it, and made it known through his persistence.

ELIMINATING SMALLPOX.

Major-General Wood, Governor-General of the Philippine Islands, gives the following interesting information regarding elimination of smallpox:

"Wherever vaccination has been carried out carefully in the Philippine Islands, smallpox has practically disappeared. Wherever it has been neglected or insufficiently done, we have had frightful loss of life. The people, who are familiar with the situation, are keenly appreciative of the benefits of vaccination.

"After effective vaccination had been established in the city of Manila there were no deaths from smallpox for seven years. It is also interesting to observe that before the days of systematic vaccination in the Philippine Islands there were approximately 40,000 deaths per year from smallpox. As effectual vaccination was carried out the disease disappeared province by province."—Through *Squibb's Messenger*.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and its branches shall become the property of the Association, with the understanding that they are not to be published in any other publication than those of the Association, except by consent of the Committee on Publication."—By-Laws, Chapter X, Art. III.

Reports of the meetings of the Local Branches should be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten, with wide spaces between the lines. Care should be taken to give proper names correctly, and manuscript should be signed by the reporter. To maintain its activity and representation each Branch should see that at least three of its meetings during the year are reported in the JOURNAL.

BALTIMORE.

The January meeting of the Baltimore Branch of the American Pharmaceutical Association was held at the Emerson Hotel, January 31, 1923, Dr. H. Engelhardt presided.

The secretary gave a résumé of the number of meetings held, the speakers and their subjects, and other important matters discussed at each meeting; and also a report of funds collected and expended.

Dr. Robert L. Swain, who was to speak concerning "Some Aspects of Pharmacy Law Enforcement" from the viewpoint of the Deputy Drug Commissioner, was unable to be present on account of illness.

Dr. Engelhardt gave a history of the development of organic chemistry, dealing mainly with the preparation of synthetic medicinals. He told of many interesting incidents surrounding the dicovery of the therapeutic value and chemical composition of such important compounds as antipyrine, acetanilide, acetparaphenetidin and phenolphthalein. The lecturer made clear that the discovery of the therapeutic value of these chemicals and the arrangement of the complex organic molecules was the result of systematic scientific investigations based on both chemical and pharmacological research.

Dr. Engelhardt asked the members present to suggest which group of organic compounds they would be interested in at a later meeting, and they asked that he speak on Synthetic Hypnotics.

The February meeting will be held on the 28th, at which time the slides of the American Colleges of Pharmacy will be shown.

B. OLIVE COLE, *Secretary-Treasurer.*

CHICAGO.

The 132nd meeting of the Chicago Branch of the American Pharmaceutical Association was held at the University of Illinois School of Pharmacy Building, Friday evening, February 9, with a large attendance of officers, members and friends.

Retiring President Snow introduced president-elect L. E. Warren, who presented as his presidential address a splendid dissertation on "Some of the Newer Things in Medicine."

Secretary Gathercoal announced that Dr. Henry H. Rusby could be in Chicago two weeks from to-day, that is, Friday, February 23, and would be pleased to address the Branch that evening. While this will throw two meetings of the Branch into February, yet the opportunity to hear Dr. Rusby is one that we should not neglect and therefore arrangements have been accordingly made for the next Branch meeting. A request was made that the announcement should be spread among the members and friends of the Branch.

Mr. Warren discussed carbon tetrachloride in the treatment of hookworm disease. This remedy, in this disease, is not only very efficacious in a single dose, but produces no known lesions or ill effects in the patient; it is inexpensive and obtainable in large quantities, hence its discovery is one of the most striking and perhaps far-reaching in the realm of medicine since the discovery of salvarsan. The speaker pointed out that a very large percentage (95 to 98 per cent. in some districts) of the population of tropical and semi-tropical countries is afflicted with this disease, and further that the disease can be eradicated in a district within a few weeks, and that there is now a possibility of practically removing the disease from the face of the earth. Carbon tetrachloride was suggested two years ago by an investigator in the Bureau of Animal Husbandry of the U. S. Department of Agriculture, who, working on the theory that chloroform was fairly efficacious in hookworm

disease, tried carbon tetrachloride as a compound containing four atoms of chlorine. Much to his surprise a single dose to a dog completely cleaned out the hookworms, and experiments on swine, horses and monkeys were equally successful. He then experimented upon himself regarding the toxicity of the substance and found that it was in no sense toxic to man. Since then the remedy has been used very extensively and in series of 20,000 cases reported from one district in the Philippines the remedy was successful in every case and no harmful results of any kind were reported. Mr. Warren discussed the life cycle of the hookworm; the history of the treatment of the disease, including the use of eugenol compounds, beta-naphthol, thymol, oil of chenopodium, and chloroform; and also the great need of education among the infested populations regarding sanitary measures, covering of the feet, etc.

Chaulmoogra oil compounds in the treatment of leprosy and the latest data on their success in this disease were next considered. He stated that the cost of the oil and its scarcity were retarding the elimination of leprosy. J. F. Rock, an investigator for the U. S. Office of Foreign Seed and Plant Introduction, has been able to collect a quantity of true chaulmoogra seed and of seedlings and these along with seeds of related trees are now growing luxuriantly in Hawaii and the Philippines. At present the commercial supply of chaulmoogra seed comes from wild trees in very inaccessible regions of Burma and India, carelessly collected by natives. It is hoped that our Government plantations of these trees will begin producing abundantly in twelve or fifteen years. It is said that the wild trees produce a good crop of the fruit only about once in three years. It is estimated that 1,000,000 liters of the oil per year would be required for several years to completely eradicate leprosy.

Mr. Warren discussed briefly some of the latest ideas regarding vitamines; the discovery and use of insulin, the hormone from the pancreas that has such a marked effect on reducing blood sugar and in the relief of diabetes; quinidine in the cure of auricular fibrillation, the use of phenyl barbitol and related compounds in epilepsy, the remarkable curative effects of "Bayer 209" in the cure of trypanosomiasis, the sleeping sickness of Africa, and the use of pollen extracts and epidermal extracts in the diagnosis and treatment of hay fever and related diseases.

The lecture was very well received.

E. N. GATHERCOAL, *Secretary.*

INDIANAPOLIS.

At the meeting of the Indianapolis Branch at the Chamber of Commerce, Feb. 5th, an appreciative audience welcomed Director Edgar B. Carter, of the Biological Laboratory of the Swan Myers Co., who had for his subject: "What the Pharmacist Should Know about Bacteriology." The subject, however, was much more than the title would indicate and the pharmacists, chemists, nurses, teachers and students present were well repaid for their time, in the instructions received.

Mr. Carter gave a very graphic explanation on the blackboard as to what bacteriology means, and the benefits to be derived by a knowledge of the subject. He said the pharmacist should know something about the general classification of bacteria, especially those pathogenic forms which are encountered in the practice of medicine; he should also know something about the simple forms of non-pathogenic forms which affect the stability of the preparations which he dispenses, and which are factors in sanitation at the soda-fountain. The common division of the bacteria is represented by the coccocae, those which are spherical in shape but which occur in different groupings such as the staphylococcus, meningococcus, pneumococcus, and streptococcus; the bacteria, the rod forms of which the *bacillus typhosus, bacillus coli, bacillus paratyphosus, bacillus tuberculosis,* and *bacillus diphtheria* are common examples; and the spirillums which may vary from curved forms up to the typical spirochaetes. The common organisms in this classification were described and their relationship to disease processes were pointed out. Simple tests for their identification were explained, as were some phenomena, as the Widal Test and other simple diagnostic procedures. The use of antiseptic and germicidal solutions was explained, and applications were made to the preservation of pharmaceutical preparations subject to bacterial deterioration. The lactic acid ferments are of special interest due to the popularity of buttermilk, Bulgarian milk, and others, as therapeutic agents, and a method of preparing Bulgarian milk in the home was given. Several examples of how moulds and bacteria are used in chemical processes and even in performing chemical tests were explained.

The bacteriological test of determining the kind of sugar in a supposed diabetic urine was well illustrated.

The discussion following the presentation brought out many points and indicated much interest in the subject. In appreciation of Mr. Carter's lecture a rising vote of thanks was extended to him.

At the close of the meeting the secretary reported six additions to the membership.

The secretary was requested to arrange, if possible, for the next meeting to be held at the Purdue School of Pharmacy at Lafayette in March.

ERNST STAHLHUTH, *Secretary.*

NEW YORK.

The monthly meeting of the New York Branch of the American Pharmaceutical Association was held the evening of January 8th at the New York College of Pharmacy.

After the reading of the minutes, Dr. Jacob Diner, as member of the Council, announced that the date of the annual meeting of the parent body had been set for the week commencing September 3rd, at Ashville, N. C.

Clyde L. Eddy, for the committee on legislation and education, stated that the prerequisite law was now in effect in sixteen states and that it would also go into effect within three years in Arkansas, Connecticut and Kentucky. He said that eight or nine states will follow the lead of New York in introducing a bill to limit the ownership of a pharmacy to a registered druggist.

Dr. Jacob Diner supplemented the above by stating that in a recent interview with Dr. Downing, assistant commissioner of education, the latter had said that the educational department will back the ownership bill to the fullest extent. Dr. Diner in reporting on the Academy of Pharmacy stated that papers of incorporation were being prepared by their attorney. Also, the New York Retail Druggists' Association has voted an appropriation of $1000 to the fund.

Dr. Mayer, chairman of the nominating committee, reported that the following ticket had been drawn up by the committee:

President, Charles W. Holton; *Vice-President,* H. B. Smith; *Secretary,* Hugo Schaefer; *Treasurer,* Robert R. Gerstner.

Committee Chairmen: Progress of Pharmacy, George C. Diekman; Fraternal Relations, Robert S. Lehman; Education and Legislation, Clyde L. Eddy; Membership, O. Canis, Jr.

They were unanimously elected.

For the Committee on the Progress of Pharmacy, Dr. Diekman presented an instructive report embodying abstracts from leading foreign journals. Among the articles referred to were: Interesting Observations on Treatment of Soils with Arsenical Sprays; Observations on Calumba Root; a New Constituent of the Thyroid Gland; the Various Varieties of Santalwood Oil; the Protection of Brass Weights. A number of formulas were also brought to the attention of his hearers.

William H. Gesell, read a paper on "Volume Production Pharmacy."

Dr. Joseph L. Meyer also gave an interesting talk on "Books and the Theatre," during the course of which he pointed out the opportunities that exist in New York for getting in touch with what is going on in the world of books and theatres.

HUGO H. SCHAEFER, *Secretary.*

UNIVERSITY OF NORTH CAROLINA.

The second meeting of the University of North Carolina Branch of the American Pharmaceutical Association was held in the Assembly Room of the Pharmacy Building, Monday evening, January 22, 1923.

After the regular business session the following papers were presented:

"The History of Rubber and the Manufacture of Rubber Sundries," by G. W. C. Rush. Mr. Rush gave a very interesting résumé of the early history of rubber and the events leading up to the present development of the rubber industries, and the processes in the manufacture of soft and hard rubber sundries. Samples of rubber and rubber products were exhibited.

"Crude Drugs of North Carolina," by Homer E. Whitmire. In the course of his paper Mr. Whitmire recounted in a very interesting way his recent visit to the firm of Wallace Brothers, Statesville, N. C., who are the oldest in North Carolina, and probably one of the largest collectors and distributors of crude drugs in America. This was especially interesting in that it brought to us the fact that North Carolina is the source of a greater variety of crude drugs than any other state in the Union, this one firm during a single year, 1920, handling well over a million pounds of native grown crude drugs. Mr. Whitmire is making a collection of drugs and preparations used by the Cherokee Indians of this state for an educational exhibit for the School of Pharmacy.

ALMOND P. WESTBROOK, *Secretary-Treasurer.*

PHILADELPHIA.

The February meeting of the Philadelphia Branch of the American Pharmaceutical Association was held Tuesday evening, February 13th, at the Philadelphia College of Pharmacy and Science.

On account of the absence of President Jenkins, Mr. E. G. Eberle was elected chairman pro tem.

The first paper of the evening was presented by Messrs. George Slothower and Peter Masucci, two research chemists. The title of their paper was "Some Physical and Chemical Properties of Neorobin."

Neorobin is a derivative of chrysophanic acid and its therapeutic uses are the same, but it is said to have certain advantages over the acid. It does not stain to the extent that chrysophanic acid does and is said to have more marked beneficial action.

According to the authors neorobin is prepared by reducing an acetic acid solution of chrysophanic acid with tin. It is a yellowish or yellowish gray powder which is not stable in the air. Its melting point is about 190° C. and is soluble in chloroform, alcohol, acetic acid, etc.

It is marketed in vacuum vials owing to instability and is used in ointment form of about a one per cent. strength.

Professor L. Gershenfeld then spoke on the advantages of the pharmacist in qualifying for bacteriological and clinical chemistry work. He cited several instances where pharmacists had materially increased their income by doing work of this kind. These men were not residents of a large city but lived and practiced in the smaller towns. He also emphasized the enhanced respect physicians have for pharmacists who qualified for this work, and the added prestige in the community.

Professor Gershenfeld then answered questions on the subject propounded by the members.

A vote of thanks was voted to the contributors of the papers.

Jos. W. E. Harrisson, *Secretary.*

SUBCOMMITTEES APPOINTED BY SERUM CONFERENCE, LEAGUE OF NATIONS.

The following subcommittee chairmen were appointed by the second international conference on the standardization of serums and serological tests of the Health Committee of the League of Nations: Serological tests, Jules Bordet, director, Pasteur Institute, Brussels; standardization of tetanus and diphtheria antitoxin, Prof. Louis Martin; anti-dysentery serum, Professor Cantacuzene, Bucharest; anti-pneumococcus serum, Prof. Neufeld, director, Robert Koch Institute, Berlin; anti-meningococcus serum, Prof. Augustus B. Wadsworth, Rockefeller Institute.

Professor Wadsworth, who represented the Rockefeller Institute at the conference, is the director of the division of laboratories and research, New York State Department of Health. He had the following to say with regard to the conference in a statement issued after his return:

"It is noteworthy that the invitations were extended by the Pasteur Institute and that in the interests of science and humanity the representatives of nine different nations found common ground for this first meeting on French soil. We all shared and enjoyed alike the cordial hospitality of the French scientists.

"Despite the many different points of view, the practical results from the free discussion were most encouraging. If such conferences can be repeated it is not difficult to understand that the ultimate results in improvement of methods used throughout the civilized world will be of the greatest significance for humanity. In the discussion of such problems the political difference between nations, even of the present stupendous problems of world politics, are forgotten in the search for truth."

The annual meeting of the French Academy of Medicine was chiefly devoted to the memory of Pasteur. Dr. Calmette spoke from the point of view of hygiene; Dr. Widal, medicine; M. Barrie, veterinary science; Dr. Delbet, surgery, and M. Delezenne, general biology.

THE DEPARTMENT OF THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES

[EDITORS NOTE.—The membership of the Conference has always recognized the necessity, as a factor of progress, of having some sort of classification of the pharmacy schools of America. Every board of pharmacy has felt this need as well, for the purpose of registration within the various states. So keenly has the Conference felt this need that annually for a number of years it has, either through its officers, its executive committee, or a specially appointed committee, implored the Carnegie Foundation to undertake this work, but to no avail. The Conference, with considerable difficulty, set its own standards for membership and has, with greater difficulty, been able slowly to increase these standards. At the present time, one of its standing committees, that on Higher Educational Standards, is at work on a plan of classification. The feeling against any self-attempted plan of standardization and classification, however, is so keen, that at the meeting at Cleveland, Ohio, in 1922, the Conference instructed its officers not to print the results of the efforts of the committee on Higher Educational Standards before they had been passed upon by the Conference in annual convention assembled. The Editor, however, cannot comprehend how any plan suggested by any committee or individual could possibly do any harm and suggestions coming in the interval between meetings might furnish food for constructive thought which would be very valuable at the time of the annual meeting.

The Editor has received advance copy of an editorial by Mr. A. L. I. Winne, of the Virginia Board, which has since been printed in the February number of the *Virginia Pharmacist*. The title of the article is, "Lay the Yard Stick on Schools of Pharmacy." The article is a keen analysis of the whole problem and teems with constructive thought. The Editor of the Conference Department has asked Mr. Winne to permit him to publish it in the Conference section of the JOURNAL so that it may be read by practically every one interested in pharmaceutical education. Mr. Winne gave his consent and the Editor assumes entire responsibility for its publication.

RUFUS A. LYMAN, *Chairman, Executive Committee and Conference Editor.*]

LAY THE YARD STICK ON SCHOOLS OF PHARMACY.

For several years there has been agitation in certain quarters for a proper classification of the schools of pharmacy of the United States, and for obvious reasons there has been thinly veiled opposition to such a procedure, and obstructions have been placed across the pathway of progress by those with axes to grind.

It probably remains for someone to determine what shall constitute the standard of perfection by which these schools may be segregated into the sheep herd and the goat herd, and there has been effort put forth to establish this ideal standard. So far little progress has been made. The American Conference of Pharmaceutical Faculties have had a committee at work on the matter for several years. They have registered progress; they have not set forth any standard by which the relative quality of any given school may be determined. As one state after another adopts prerequisite pharmacy legislation they are confronted with this problem of recognition of the schools teaching pharmacy. The state boards are forced to grope in the dark and weed out the ineligibles and establish a list of those acceptable under their particular laws. It is a tiresome process, and is gone about from different viewpoints by different states. How much saner would be a nationally established standard of quality, proficiency, eligibility—what you please—so long as it is a recognized standard, and one that any state might accept in good faith.

Realizing the improbability of the American Conference of Pharmaceutical Faculties ever coming to a common agreement on the subject—and it would be miraculous if they should, sitting as judge and jury, as it were, at the bar before which their own cases must be tried—the National Association of Boards of Pharmacy, at their meeting in Cleveland last August, discussed the advisability of undertaking this work in behalf of the ever-increasing number of state boards that are facing the problems presented by a lack of their proper solution. In the latter part of September Secretary Christensen, acting upon the adoption of a resolution providing for a com-

mittee to "formulate rules and regulations by which 'reputability' or recognition of schools of pharmacy or colleges of pharmacy and departments of pharmacy of universities may be determined with a view of compiling a list of these institutions, so that both rules and lists may be available for the individual state boards of pharmacy," sent out a letter inviting suggestions to be placed at the disposal of the proposed committee. We do not know what response he has received, other than the suggestion offered by Virginia, which is embodied herewith.

We believe that the N. A. B. P. has not put its finger upon a softer spot than this very one of evaluating the schools of the country which are teaching pharmacy, since its inception. We do not know of a more constructive piece of work that the organization could undertake. It should be tackled in a whole-hearted fashion—set the line, hew to the line, let the chips fall where they may. Carried through to a definite conclusion the work would do much toward accomplishing desired legislative reform, facilitate reciprocal exchanges, and hasten the day of uniformity of procedure on the part of the individual boards, so much desired.

That there is the necessity that some organization undertake this work is conceded, and it seems to the writer not only an opportunity for the N. A. B. P. to score, there is even something of the aspect of an obligation to perform, a distinct service for its constituent members. The A. C. P. F. should not be left to work this out alone. Knowing this organization's make-up, its aims and ambitions, its factional divisions—all perfectly natural manifestations of a virile body steadily working toward the accomplishment of an ideal condition, but divided as to the route it should take and the duration of the journey—they should be assisted materially by the boards, or the work taken entirely out of their hands. The N. A. B. P. certainly has the whip hand in the matter if it is disposed to wield it. The boards can force the schools to any reasonable standards they may set. These standards in turn, of course, would be largely determined by the character of the laws under which the several state boards had to operate. This would insure sanity. It is our belief that many of the schools are more than anxious to have their own reputability established according to some recognized standard; many others need but to be shown wherein they are deficient and they will willingly adjust their affairs so as to come within the ideal conception of the standard of eligibility. The need of the day is the establishment of a standard—adherence to this standard may be left to take care of itself. The law of self-preservation will assert itself as occasion arises.

A competent committee of N. A. B. P. members should be empowered to undertake this work, and they should be accorded a reasonable latitude in securing such outside professional aid as they may deem necessary. The secretary of the organization should be an active member of this committee, because of his familiarity with the organization's affairs, and the work he has already done toward the collection of information from member boards with respect to their attitude toward the schools at the present time. No member of this committee should be permitted to pass upon the eligibility of a school located within his own state, and for this reason the committee should be subject to such necessary changes as the president might see fit to make. We do not believe that any member would want to participate in the appraisal of a school within his own state.

The first work to be taken up by such a committee would probably be the determination of what factors should be considered of paramount importance—in the light of the avowed aims and ideals of the N. A. B. P., for the evaluation ought to be approached as one undertaken to satisfy the demands of this organization. If in the future we come to a realization that better standards have been attained than we have formulated it will be a simple matter to discard the old and adopt the new. We are at present outside the threshold of the whole matter. So far no one has done anything but talk about the desirability of having the work done and to wish that somehow it had already been done by somebody else.

Considered in the above light, the first item that would seem to suggest itself would be the number of years of high school preparation required by a given school as a prerequisite for matriculation. Our program calls for four years of such training, or its equivalent. That would give us a starting point. The number of full time teachers employed by a school is another. The number of hours of class room work and laboratory practice, and whether these are given as day instruction—that is, prior to 6 P.M.—and whether a school is maintained as a three day school or a five or six day school. This latter is of importance, since there are schools having large attendance which crowd the class rooms and laboratories to overflowing in order to measure up

to the number of hours per year that are demanded, but who teach their junior classes only three days a week and their senior classes only three days a week. It is obvious that such schools cannot do as complete justice to their students as schools that maintain a five or six day a week schedule for all their students. The attention given to the dispensing of medicinals by students under training is another important matter which most schools ignore almost entirely. Attention should be given to this matter in any evaluation. A student who perfunctorily slaps together a prescription destined for the slop-can will never learn to assume the responsibility which is instilled by the filling of prescriptions destined to be consumed by actual patients.

The determination of classification it would seem to us could most acceptably be based primarily upon the number of years of high school preparation demanded by a school of its matriculates, and other factors be treated as collateral. This would at least furnish a basis to start from. With this basis adopted all such schools as demand four years of high school work, or its equivalent properly established by state educational authorities, as a prerequisite for matriculation, could be classed as "A" schools. A school that demanded this of its matriculates, and in addition maintained a five or six day week, and lived up to requirements in regard to hours of class room work and laboratory practice, maintained a proper number of full time teachers, and in every other respect maintained standards equal to those regarded as the standard, could then be rated as an A-1 school. One that nearly approached the ideal, but was lacking in some one respect, might be classed as an A-2 school. One which lived up to the ideal in all respects except in two or more instances could be grouped as A-3 or A-4. Such schools as met all the requirements except in the matter of high school work, and demanded but three years of such preparation for entrance, could be classified as B-1. Those of the three year group showing deficiencies could be grouped similarly to the "A" groupings, that is, as B-2, B-3 and B-4 schools. Such schools as demanded only two years of high school work for admittance could likewise be grouped as C-1, C-2, etc. Those with only one year high school requirements could be carried in a D class. It would hardly be worth while to dignify with any recognition the quacks, quizzers, correspondence schools and night schools which are attempting to teach pharmacy.

With some such ratings impartially attached to schools of pharmacy no state board would need to hesitate to accord recognition to such as were worthy of their approval. It would not necessarily follow that a given state board would want to recognize, for instance, only A-1 schools, or even any of the class A schools exclusively; they might be in a position to recognize the class A, the class B, and perhaps the other classes. That is not the point. The fact that the schools would have been officially classified by a recognized organization in which all boards have confidence would go a long way toward dissipating the uncertainty with which applicants are occasionally accepted for state board examinations, and would remove the possibility of injustice being done a worthy applicant, whose application might be rejected because of the uncertainty involved. With the N. A. B. P. stamp of approval upon a school its applicants could be accepted for examination by all boards with a greater degree of confidence that they were not being imposed upon. And we are further of the opinion that it would be a matter of but a short time till we had a large group of A-1 pharmacy schools in the United States, and a very small and delicate group of all other classes combined.

A. L. I. WINNE.

NITROUS OXIDE IMPORTANT FOOD PRESERVATIVE.

In the German journal, *Archiv. Hygiene*, 1922, volume 91, page 1, there is given an interesting account of a number of experiments made with nitral, nitrous oxide, for the preservation of food. Fresh whole milk may be conserved at a nitral pressure of 30 to 35 atmospheres and a temperature of 37 degrees Centigrade in such a degree that the milk will maintain its fresh condition for as long as a month without being cooled or watched in any way. The milk is kept in its original condition and its nutritious value is maintained constant. In a similar manner such foodstuffs as meats and fish are preserved effectively by the use of nitral. Preserved meat and fish will keep fresh for a far longer time than ordinary fresh food. The cooking of such food may be carried out without any difficulty and the taste of the cooked product is satisfactory. —Through *Scientific American*, March.

EDITORIAL NOTES

Editor: E. G. EBERLE, Bourse Building, Philadelphia, Pa.

Committee on Publication: A. G. DUMEZ, *Chairman;* S. L. HILTON, H. M. WHELPLEY, R. A. LYMAN, W. L. SCOVILLE, and the Editor-in-Chief of the JOURNAL, General Secretary, Treasurer and Reporter on the Progress of Pharmacy, *ex-officio.*

Collaborators: JULIUS A. KOCH, President, A. Ph. A.; CHARLES H. LAWALL, President, A. C. P. F.; EDWARD WALSDORF, President, N. A. B. P.; E. FULLERTON COOK, Chairman, U. S. P. Revision Committee; W. L. SCOVILLE, Chairman N. F. Revision Committee; S. L. HILTON, Chairman, Council A. Ph. A. The Chairmen of the Sections, A. Ph. A.: ARNO VIEHOEVER, CROSBY B. WASHBURNE, W. F. GIDLEY, WALTER M. CHASE, CLYDE L. EDDY; E. F. KELLY and WILLIAM B. DAY of the House of Delegates; A. G. DUMEZ, Secretary of the Council, the General Secretary, and the Reporter on the Progress of Pharmacy.

A CASE OF TETANUS FOLLOWING POISONING BY FIELD NARCISSUS (*Narcissus Pseudo Narcissus* L.).

CONDENSED FROM THE FRENCH BY WM. H. GANO.

In May 1922, a family of four, father, mother and two sons (14 and 15 years), during a walk in the country gathered some bulbs which they believed to be jonquils with the intention of transplanting them in their garden.

The bulbs were placed in a cool place near the kitchen sink; when evening came, the cook, desiring to prepare some stewed leeks for the evening meal, used, inadvertently, these bulbs. The dish was consumed to the liking of all hands. During the night, the four members of the family were seized with violent abdominal pains and nausea. The physician called diagnosed the trouble as a poisoning—the error in cooking was recognized and an emetic was prescribed for each, with an abundance of milk as an antidote. Only the younger son, who presented the same primary symptoms, failed to respond to the treatment. During the following day the symptoms continued, with retching and diarrhoea. The following day saw rapid recovery of the father, mother and older son.

The younger son alone had not done any true vomiting, only violent retching, with abdominal pains, and diarrhoea.

The attending physician reports the progress of the disease and details two "crises" of tetanus, the second following the first after a few days. Only the concluding paragraph of the physician's report is quoted:

"There is no doubt that the two 'crises' of tetanus were caused by the poisoning cited above. It is not usual to come upon this malady in the course of an alimentary intoxication; we have found no reference to it in medical literature. On these grounds this case merits reporting. It is known that tetanus has shown itself with children during nursing, and in the course of certain maladies, such as typhoid fever, cholera, gastric dilatation. Digestive troubles play a preponderant rôle in the etiology of tetanus. The patient was an 'enteritic' of long standing, perhaps in this fact resides the reason for the attacks noted above."—M. E. Martin-Sans and Dr. de Verbizier—of the Faculty of Medicine and Pharmacy, Toulouse, in *Bull. des sci. pharmacolog.*

IS ANY PHARMACEUTICAL RESEARCH BEING PERFORMED?

In discussing the subject—"Pharmaceutical Research," in *International Clinics* —Dr. H. V. Arny (now president-elect A. Ph. A.) submits four questions; the one indicated by the title is the third, the answer to which he introduces by reference to an address delivered in 1920 before Pennsylvania Pharmaceutical Association* in which a roll of honor of forty-seven workers is given. He continues: "Taking up the work of the past as well as the present, I will here only cite Scheele, the Swedish pharmacist, who discovered the fruit acids as well as the element chlorine; Sertürner, the apothecary of Eimbeck, who isolated morphine, the first discovered alkaloid; Pelletier and Caventou, *pharmaciens* of Paris, discoverers of quinine and other cinchona alkaloids; Procter, the Father of American Pharmacy, whose research work included the development of the art of percolation, the manufacturer of elegant pharmaceuticals and the study of the constituents of crude drugs; Squibb, the great manufacturer whose study of percolation is a classic; Lloyd, another manufacturer, whose work on capillarity and adsorption is now cited by physical chemists as pioneer

* J. AM. PHARM. ASSOC., 9, 684, 1920.

work along these lines; and thus unto the present time, when those investigators cited upon a preceding page are performing work of vast credit to science as a whole and to pharmacy in particular.

"No better answer to the question: 'What research work is being done by pharmacists?' can be given than the bare statement that at the 1922 meeting of the Scientific Section of the American Pharmaceutical Association over eighty papers were presented by their authors."

THE CURIE FUND OVERSUBSCRIBED.

From the fund collected by the women of America to present a gram of radium to Mme. Curie, there remains, after about $110,000 had been paid for the radium, a surplus of about $50,000, the annual income from which will be given to Mme. Curie.

ERRORS IN ORDERS FOR BARIUM SULPH.

It is a fact quite generally observed that an error in the sale of a poison is often followed by others. The unfortunate errors in dispensing barium sulphide have been so generally reported in the press that no warning is needed for the present, but it is well to guard against recurrences. There was a time when the calomel bottle was next to the one containing mercuric chloride, and physicians used abbreviations which might have left the dispenser in doubt as to whether hydrated chloral, calomel, corrosive sublimate, or hydrochloric acid was wanted. The containers for barium sulphate and that of barium sulphide should not be in the same section; physicians who write "barium sulph." should discontinue doing so. Everyone regrets the errors committed and sympathizes with all concerned; both barium sulphate and sulphide are called for in drug stores.

COMPETITIVE EXAMINATIONS FOR CHEMIST.

The United States Civil Service Commission announces open competitive examinations for the positions listed above. Vacancies in the Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., at the salaries indicated, and in positions requiring similar qualifications, at these or higher or lower salaries, will be filled from these examinations, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

The salaries range from $3000 to $5000 for chemist, $2000 to $3000 for associate chemist, and $1600 to $2000 for assistant chemist. Applicants should apply for Form 2118 to the Civil Service Commission. Receipt of applications will close March 27.

PERSONAL AND NEWS ITEMS.

Prof. J. U. Lloyd has returned from West Indies where he had gone for recuperation. It will be remembered that about a year ago he was seriously ill with pneumonia. Advices indicate that he is much improved in health.

President J. L. Hopkins, of J. L. Hopkins & Co., has returned to his desk after an absence of eight weeks due to illness, much improved in health.

Miss Marie A. Piesinger is president of the Minnesota Board of Pharmacy.

President Julius A. Koch, A. Ph. A., was one of the speakers at the dedication exercises of the Philadelphia College of Pharmacy and Science, February 23. His concluding remarks dedicated the site to the use of the institution for "continued service to humanity, to pharmaceutical education and research in the full assurance that the present and future faculties will emulate their distinguished predecessors in maintaining their lofty ideals and raising to ever higher and higher planes our beloved profession."

Ex-President Caswell A. Mayo, A. Ph. A., has on a number of occasions yielded to poetic inspiration; recently, in lines to the "Up-to-date Baby." From these the following are quoted: "You're an up-to-date baby. Maybe it is best To forego the rocker, the songs and the rest; But it seems to me, baby, you'll miss quite a lot Of the romance of life that we old fogies got."

Prof. Curt P. Wimmer has contributed to the *Pharmaceutical Era* an interesting outline of the early history of the New York College of Pharmacy. The institution was founded in 1829 and is approaching its centenary. Illustrations accompanied the article.

A monument, thirty-five feet in height, is to mark the grave of Sergeant Joyce Kilmer, poet soldier, who died fighting in France with the Sixty-ninth Infantry. Sergeant Kilmer, a member of the staff of the New York *Times,* was the son of our fellow-member, **Dr. F. B. Kilmer,** New Brunswick, N. J. The monument is to be put in place next summer when Dr. and Mrs. Kilmer go abroad to visit the French cemetery where he rests. The memorial is the work of Paola Abbate, famous Italian sculptor.

United States Senator-elect **Royal S. Copeland,** for many years New York City Health Commissioner, was among the prominent speakers at the annual dinner of the New York

Retail Druggists' Association who paid tribute to the ideals and personnel of the association. Dr. Copeland, who devoted a large part of his talk to a discussion of the growing menace of the drug evil, declared that only to a negligible degree were the retail druggists of the state responsible for the growth of narcotic habit. He added that little or no supervision over the retailers was necessary to compel them to live up to the letter of the narcotic law.

Ex-President Lewis C. Hopp, A. Ph. A., met with a serious loss in the destruction of his pharmacy by fire. Those who know the type of pharmacy conducted by Mr. Hopp can realize what the fire meant to him, and sympathy is extended.

A. & R. S. Lehman have sold their pharmacy at 375 Third Ave., New York City, to Clement Grassi. The former owners bought the store from Riedel & Son in 1900; it is one of the oldest and best-known establishments in this section of the city.

Peter S. Rohn is the new president of the Philadelphia Retail Druggists' Association.

Frank J. Dubsky, a former president of Illinois Pharmaceutical Association, is president of Chicago Retail Druggists' Association.

Secretary-Treasurer A. G. Hulett, of the recently organized Arizona Pharmaceutical Association, writes of the association as a "good husky western fellow—ready to lend aid and strength to build up pharmacy."

F. Wayland Ayer, of N. W. Ayer & Son (advertising), died March 5. He was internationally known as one of the fathers of modern advertising. He was a successful business man and interested in many philanthropic and benevolent movements.

The Pharmaceutical Journal and Pharmacist, February 10, 1923, comments at length editorially on "The Digest of Comments on the Pharmacopœia of U. S. and on National Formulary" for the year ending December 31, 1920. The editor states: "By this means the revision committees get a good general impression as to the trend of opinion on the various questions at issue, a method of working that is now definitely established in the states, and that might, with great profit, be adopted here at home."

Walter D. Adams, Secretary-Treasurer, Texas Pharmaceutical Association, has this as a business motto: "No promise is ever barred by the statute of limitation." His advertising attracts attention; the following are the introductory lines of "Fly-Way" advertisement: "A bob-tail cow during fly-time stands about the same show as a humming bird in a bull fight." The store and the man are sketched in *The Crowdus Drug News,* for January, a house organ.

President H. L. Haussamen, of the North Dakota State Board of Pharmacy, and wife, also Mr. and Mrs. **Charles H. Huhn,** have been spending part of the winter in the South.

Dr. Edward C. Franklin, professor of organic chemistry at Stanford University, Palo Alto, Cal., who was recently elected president of the American Chemical Society, will leave about the middle of March for a tour of the country, to lecture before local sections of the American Chemical Society and classes in the large universities.

U. S. Senator-elect from Michigan—**Woodbridge Ferris,** of Big Rapids, Mich.—is the founder of Ferris Institute, attached to which is a department of pharmacy. While not a pharmacist, he has given direction to the studies of many young pharmacists. **Hon. George W. Edmonds** is, if our information is correct, the only graduate pharmacist in Congress.

ANNUAL MEETING OF AMERICAN DRUGGISTS' FIRE INSURANCE COMPANY.

At the annual meeting of the American Druggists' Fire Insurance Company, held February 13 and 14, in Cincinnati, Samuel C. Davis, of Nashville, and Edward Voss, Jr., of Cincinnati, were elected directors in place of the late Simon N. Jones and A. O. Zwick. Louis C. Hopp was elected to fill the vacancy on the executive committee caused by the demise of Dr. A. O. Zwick.

OBITUARY.

JOHN BEST.

By Samuel T. Hensel.

John Best, one of the pioneer druggists of Colorado—for fifty years a loyal member of the American Pharmaceutical Association—has crossed "the great divide," leaving behind him memories which his family, friends and business associates will ever cherish—of a genial, gentle soul. He was a type of the educated young man coming to the West—of the educated pharmacist and druggist of that day who came to seek his fortune.

The importance of the time and place of his advent to the great West compels me to digress

in order that I may convey to the reader a correct idea of the environment in which he lived, and of the activities in which he engaged throughout a long and honorable life.

John Best was born in Bristol, England, March 18, 1843. He came to America when a boy and soon thereafter entered the New York College of Pharmacy, graduating in 1865. His preceptor, a Mr. Hayes, subsequently sent him to Central City, Colorado, to take charge of a store, of which he later became the proprietor.

Central City, Gilpin County, was then a thriving mining town situated far up in the heart of the mountains at an altitude of 9000 to 10,000 feet above sea level—nearly at timberline. It was the adopted home of a large number of young men of vision and with constructive ability, who, in conjuntion with other hundreds of young men of equal caliber in other parts of the territory, subsequently, in 1876, brought about the creation of the great commonwealth of the state of Colorado. Three of them, Henry M. Teller, Nathaniel P. Hill and Edward O. Wolcott, became United States Senators. William N. Byers founded the *Rocky Mountain News* and was its first editor. Nathaniel P. Hill, young chemist, founded the *Denver Republican*, and was also engaged in other activities which will be referred to later. Joseph Thatcher and Dennis Sullivan were the leading spirits of the Denver National Bank. Walter Cheeseman, for many years a leading druggist, organized the Denver Union Water Company and was connected with other public utilities and enterprises.

JOHN BEST.

These great names give added luster to the little mining town of Gilpin County, which came into being as a result of the decline of placer and other mining in California in 1859—ten years after the first great rush to the gold diggings—for here was found a friable ore which yielded enormous returns of native or metallic gold.

The miners of that day did not understand the scientific meaning of this red earth, and it was not until the geo-chemist stepped in and explained its origin, that lode mining was revived and carried to greater depth, with the result that Colorado continued for nearly a generation to enrich the nation and the world with its seemingly exhaustless treasures. It was red oxide of iron they explained, and was the result of the decomposition of iron pyrites, or iron sulphide, which was invariably found at the beginning of the permanent water level, at a depth of from 75 to 150 feet. This announcement immediately led to the revival of the mining industry both here and in California. Nathaniel P. Hill, a chemist of ability, availed himself of the process of roasting this sulphide ore. He erected a smelter for that purpose which brought him fame, fortune and, subsequently, senatorial honor.

It was in this environment and with these associations that the subject of this sketch lived for many years, and was honored. He became the mayor of the town and was ever ready to perform his duty as a citizen. In 1887 he sold his store to Llewellyn P. Davies and moved with his family to Denver. He never reëntered the retail drug business, but for many years served as a member of the State Board of Pharmacy, then known as the Board of Examiners, of which for a time he was the president.

His love for the American Pharmaceutical Association was unfaltering, and with the exception of the past year or two he was a regular attendant at the monthly meetings of the Denver Branch. Several years ago, Mr. Best presented to the Branch a complete set of the Proceedings of the American Pharmaceutical Association, from the first volume down to the time of the first edition of the YEAR BOOK.

Mr. Best married Miss Margaret C. King in 1871, and they had three children, one son and two daughters; the widow and one daughter survive him. He died January 30th of pneumonia.

For some years Mr. Best was known as the oldest druggist in Colorado and the oldest living graduate of the New York College of Pharmacy. He was a man of fine personality—kind, gentle and considerate of others—in a word, a gentleman of the old school.

The American Pharmaceutical Association and the Denver Branch, A. Ph. A., have lost an ardent and faithful member, whose memory will long be cherished.

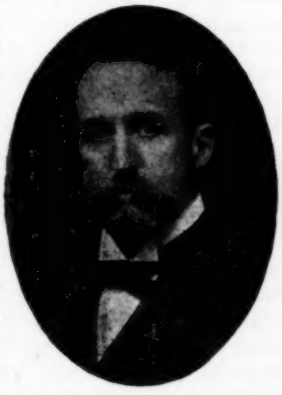
CLEMENT BELTON LOWE.

Dr. Clement Belton Lowe passed away at his home in Vineland, N. J., February 5, 1923.

The sudden call came as a shock to friends, owing to the fact that he had held up so well after the passing away of his wife on January 23rd.

The following data are taken from the Century volume of the Philadelphia College of Pharmacy:

Clement Belton Lowe was born in Salem, N. J., in 1846, and his early education was obtained in the public schools of that place. Later he spent five years in Bucknell University, Lewistown, Pa., from which he was graduated in 1865 with the degree of Ph.B. He spent the year 1866 at the Philadelphia Polytechnic College, intending to become a civil engineer, but was compelled by ill health to relinquish this purpose. In 1867 he entered the drug business with William Lippincott at the northeast corner of Ninth and Vine Streets, later succeeding to the sole ownership of the business, which he continued until 1895. He became a student at the Philadelphia College of Pharmacy in 1882, and was graduated as a Ph.G. in 1884. He subsequently studied medicine at Jefferson Medical College, from which he was graduated in 1887. In 1899, he purchased the Pelham Pharmacy in Germantown, which he conducted until 1914, besides devoting part of his time to the practice of medicine.



CLEMENT BELTON LOWE.

In 1886 he became assistant to Professor John M. Maisch and when Professor Edson S. Bastin succeeded Professor Maisch, in 1893, he continued in the same position.

Upon the demise of Professor Bastin in 1897, Dr. Lowe became professor of materia medica, physiology and pharmacology. He served as chairman of various important committees, and in 1907 was elected president.

He also was a prominent worker in the American Pharmaceutical Association, which he joined in 1895. He occupied the position of secretary and chairman of the Section on Education and Legislation from 1899 to 1901, and was vice-president in 1909. He was for some years editor of the Alumni Report of the Philadelphia College of Pharmacy, the author of "A Syllabus of the Botanical Natural Orders" which has passed through several editions, and editor of the volume on "The Medicinal Plants of the Philippines."

Since 1914 when he sold his drug store in Pelham, Germantown, he resided in Vineland, N. J.

He resigned and was made professor emeritus of materia medica in 1921, when he was succeeded by Dr. Horatio C. Wood, Jr.

Dr. and Mrs. Lowe had four children, two sons and two daughters. The former are now living in Vineland, N. J.; the daughters died in 1900.

Prof. Frank X. Moerk, W. L. Cliffe, E. G. Eberle, and officials of the Baptist Church, Vineland, served as pall-bearers.

CHARLES WILLIAM GRASSLY.

Charles William Grassly, a member of the American Pharmaceutical Association from 1884 to 1917 and a charter member of the Chicago Veteran Druggists' Association, died at the home of his sister at Jacksonville, Ill., Monday, February 19th.

The deceased was born in Germany, December 5, 1847. He came to the United States in 1863, and graduated from St. Louis College of Pharmacy in 1868, of which institution he was the oldest living alumnus. He entered the drug business as a clerk in Chicago in 1863, and was in business on his own account since 1872 until his retirement a few months ago. He was a charter member of the Chicago Veteran Druggists' Association.

John Hurley, a pharmacist of Little Falls, N. Y., and widely known as an organizer, died at his home February 18th at the age of 62 years. He was for many years a member of the New York State Board of Pharmacy. He joined the New York State Pharmaceutical Association in 1896 and was active in its meetings. In 1906 he helped organize the Mohawk Valley Drug Association, of which he was the first president. At the time of his death he was chairman of the board of trustees of the Raybrook State Tuberculosis Hospital.

Mrs. Matilda Patch, wife of Ex-President E. L. Patch of the A. Ph. A., died February 7th at St. Petersburg, Fla. Mrs. Patch frequently attended earlier meetings of the American Pharmaceutical Association with her husband, and took an active part in the entertainments when the Association met in Boston in 1911. She was born in Amherst, Mass., 71 years ago and besides her husband she leaves five sons, Joseph A., Claude E., and Ralph R., of Stoneham, Mass.; Arthur L.

of Winsor, Vt., and Ernest L. Patch, Honolulu. Professor and Mrs. Patch had gone to Florida hoping to gain strength and health. The sympathy of the American Pharmaceutical Association is extended.

Dr. Gustav D. Hinrichs, who for many years was a member of the American Pharmaceutical Association, died at his home in St. Louis, Mo., February 14th at the age of 86 years. Dr. Hinrichs was educated at the University of Copenhagen, and came to the United States soon afterward. For a number of years he was a member of the faculty of the St. Louis College of Pharmacy.

Dr. William Caspari, Professor of Materia Medica at the College of Pharmacy of the University of Maryland, died February 13th. He was a graduate of the Maryland College of Pharmacy and also of the Baltimore Medical College. He was a son of the late William Caspari of a family well known in pharmacy, and was 60 years old.

Henry Thacher, for many years senior member of the firm of S. A. D. Sheppard Company, druggists, of Boston, Mass., died in Dorchester, aged 66.

WILLIAM KONRAD ROENTGEN.

Professor William Konrad Roentgen, discoverer of the X-ray, died February 10th. He was born in Lennep, Prussia, March 27, 1845. He studied at Zurich, Switzerland, where he took his doctor's degree in 1869. After service as professor of physics in various German universities he was sent in 1885 to Würzburg, where in 1895 he made the discovery for which his name was chiefly known, that of the Roentgen X-ray. It is said that in 1896 Roentgen was approached by one of Germany's largest electrical concerns to make his invention available for technical purposes and manufacture, but that while approving of the idea he rejected the suggestion of personal coöperation, saying: "What I have discovered belongs to the universe."

SOCIETIES AND COLLEGES.

WHY PHARMACISTS OPPOSE SALES OF DRUGS IN GENERAL STORES.

Bulletin No. A, 1—News Service of Drug Trade Bureau of Public Information—Robert P. Fischelis, Director.

Whenever physicians foster public health measures which may incidentally require a visit to the doctor's office, they are accused of selfish motives by some people who either do not think or who cannot understand the altruistic spirit which a great majority of the medical profession constantly exhibit in matters of public welfare. Similarly other professional men are abused whenever they advocate any measure intended to benefit the public at large, if by any chance such measures may even indirectly benefit some of their number financially. There are occasions in every trade and profession when certain benefits are derived as the result of legislative enactments intended for the good of all the people. Should such enactments be prevented just because a few happen to profit directly while all profit indirectly? Common sense dictates a certain tolerance in matters of this kind, for it is well known that no legislature can long endure if its enactments savor of class favoritism.

In a number of states bills are now before the legislatures, which seek to limit the sale of drugs and the compounding of prescriptions to those who are qualified and licensed to do this very important public health work. In most of the states such laws are already on the statute books. General storekeepers oppose these bills on the ridiculous ground that they are sponsored by selfish druggists who want to force people living in rural districts to buy goods from them, rather than from the general store. The best answer to these accusations is that all such proposed bills either make specific provisions for the sale of common household remedies in original packages by general stores, where there is no pharmacy within a reasonable distance, or specifically provide that the law shall not apply to the sale of home remedies in original packages by general stores.

Any honest champion of the cause of the rural citizen should be satisfied with such provisions and should realize fully that no matter how much general merchandise a druggist may sell, he is the only proper person to sell drugs and compound medicines. The state laws all require a licensed druggist to have at least four years of pharmaceutical experience and in many states he must be a college graduate. Every state requires registered pharmacists to pass a qualifying examination and the standards for licensure are going higher and higher every year. If the people did not believe that

the sale of drugs and the compounding of prescriptions required special skill and training why would they exact such qualifications? To let a general storekeeper sell and compound drugs promiscuously would be equivalent to letting the man on the street perform a surgical operation.

The few dollars per year which might be diverted from the druggist's till because of sales of packaged medicines in general stores do not enter into the question. The bills in question are designed to protect the public. As a professional man the pharmacist together with the physician is interested in the public health. That is his reason for advocating such legislation. Medicines are not intended to be sold as other merchandise is sold. They are intended for use only in cases of sickness upon the advice of a physician. Those people who resort to self-medication should at least have the safeguard of the advice of an intelligent licensed pharmacist to keep them from committing any grave errors in the selection of their remedy. The storekeeper's only interest in the sale of drugs is the profit. He cannot give advice because he does not know and is not expected to know anything about drugs. If he claims to have the experience and qualifications necessary to sell drugs he can acquire the right to do so, legitimately, by passing the necessary examinations and qualifying as a pharmacist. It seems anomalous that the same laws which lay down the qualifications of those who may sell drugs and medicines do not also limit the sales of these commodities to establishments employing such qualified help. The need for the special laws or amendments to existing laws covering this point is therefore quite obvious.

PLAN OF COÖPERATION WITH AMERICAN PHARMACEUTICAL ASSOCIATION OUTLINED.

The *Sunflower Druggists' Bulletin*, the official organ of Kansas Pharmaceutical Association, published in full the plan of coöperation with the American Pharmaceutical Association, as sent out by the officers of the House of Delegates. This is an effective way of making members of the state association acquainted with the plan. Ex-President L. E. Sayre is preparing for an interesting program of the Scientific Section of Kansas Pharmaceutical Association.

NORTHERN AND CENTRAL CALIFORNIA ASSOCIATIONS.

In a recent *Bulletin*, W. Bruce Philip, one of the vice-presidents-elect of the American Pharmaceutical Association and a vice-chairman of the House of Delegates, gladly shares the honor of his election with the constituents of the live, working drug organizations of California in whose service this honored member is active.

AMERICAN PHARMACEUTICAL ASSOCIATION ACTIVITY IN SEATTLE.

The following is reprinted from the *Pacific Drug Review:*

The American Pharmaceutical Association is well represented in Seattle, there being at present between sixty and sixty-five members. Thirty-two of this number are students and faculty who are members of the Association. The students have felt that in conjunction with their library reading and courses in reference work the journal which they receive and membership in the society are well worth while. Plans are being formulated for a local section of the Association. An application will be made to the national organization and if the local section is formed it will be made to include all members of the Association in the Northwest, provided they care to affiliate. Besides the personal interest to be derived from the local organization, much should be obtained from the close coöperation with the national Association. Complete details have not been worked out, but it is hoped there will be many members in this section of the Northwest interested in the local branch. All those interested or who have any suggestions as to this new local chapter, are urgently requested to take the matter up with Dr. C. W. Johnson, dean of the College of Pharmacy of the University of Washington.

TRAFFIC IN LICENSES.

W. H. H. Miller, former director of the department of registration and education in Illinois, who was alleged to have sold physicians' and pharmacists' licenses and raised examination grades, was found guilty by a jury and fined $1000; the head of a "quiz" school where doubtful candidates were prepared for examinations was fined $250. The *Chicago Times* editorially points out the insufficiency of such punishment.

Addison M. Shelton, successor of W. H. H. Miller, dismissed three members of the State Pharmacy Board—D. P. Seibert, chairman of the executive board of the Chicago Retail Druggists' Association and Illinois Pharmaceutical Association; Dwight D. Moore, leading druggist in Bloomington; and R. R. Barnes of Bushnell. The two former have started a fight for vindication.

THE AMERICAN PHARMACEUTICAL MANUFACTURERS' ASSOCIATION.

The American Pharmaceutical Manufacturers' Association will hold its annual meeting at Altamonte Springs, Fla., on March 19th. The Association, in an endeavor to "advance the science of manufacturing pharmacy to the highest attainable degree of efficiency and ethical service," has offered three prizes for the most constructive and helpful essays on the subject, "How Can American Manufacturing Pharmacy Better Serve the Medical Profession?" The prizes are $100, $50 and $25, respectively. The competition is open to all students in the present senior year of a number of leading universities.

SPRING MEETING OF THE AMERICAN CHEMICAL SOCIETY.

The spring meeting of the American Chemical Society will be held with the New Haven and Connecticut Valley sections at New Haven, Monday, April 2, to Saturday, April 7, inclusive. All the divisions and sections in which pharmacists are interested are planning extensive meetings. Several instructive excursions are being arranged.

One outstanding feature of the program is the dedication of the new Sterling Laboratory at Yale University on Wednesday.

OFFICERS OF METRIC ASSOCIATION.

The name of the American Metric Association was changed to "Metric Association" at the last annual meeting. Effort should be made to bring about uniformity in writing metric abbreviations. The officers for 1923 are: George F. Kunz, New York, President; Arthur E. Kennelly, Cambridge, Mass., 1st Vice-President; Theodore H. Miller, Poughkeepsie, N. Y., 2nd Vice-President; Wm. Jay Schieffelin, New York, 3rd Vice-President; Frederic L. Roberts, New York, Treasurer; Howard Richards, New York, Secretary. Those on the Executive Committee for 1923 are: Arthur P. Williams, New York; Mrs. Louise Stevens Bryant, New York; W. P. Dobson, Toronto, Canada; David A. Molitor, Detroit, Michigan; Samuel W. Stratton, Cambridge, Mass.

MINNESOTA PHARMACEUTICAL ASSOCIATION.

The Northwest Drug Show held during the meeting of Minnesota Pharmaceutical Association was an interesting exhibit. Trees and plants were shown from which drugs, oils and spices are obtained.

Dean Frederick J. Wulling opened the convention of the state association and in his address advocated restriction of the number of drug stores and advancing the requirements for students of pharmacy.

The following bodies held meetings during convention week: the Northwestern Branch of the American Pharmaceutical Association; Northwestern Division of the American Chemical Society; Northwestern States Rexall Club; fifth district members of the National Association of Boards of Pharmacy and the Northwestern Pharmaceutical Bureau.

One of the features of the convention was the program provided under the auspices of the Northwestern Branch, A. Ph. A. It was opened by Dr. Henry Kraemer of Mt. Clemens, Mich., who presented an illustrated lecture on the modern manufacture of medicine in the retail pharmacy. Dean Wulling gave an illustrated lecture on medicinal plant gardens, and Dr. H. H. Rusby an illustrated lecture on his recent exploration trip to South America. Prof. E. L. Newcomb presented a paper on "Organizing American Pharmacy."

NEW YORK STATE PHARMACEUTICAL ASSOCIATION INFORMATION COMMITTEE.

The Information Committee of New York State Pharmaceutical Association—Clyde L. Eddy, chairman—is distributing cards to drug stores informing the public of the large increase in the number of drug stores since prohibition (?) became effective. A chart that tells the story—"more new drug stores have been opened in New York State since January 1920 than in the 10 years preceding that date." The public is asked to consider the facts presented on the cards and aid in the passage of Assembly bill No. 483.

PHARMACEUTICAL EXHIBIT IN GREENVILLE, S. C.

The North Carolina Pharmaceutical Association and the South Carolina Pharmaceutical Association will hold their separate annual conventions and also hold a joint convention in Greenville on June 26 to 28, inclusive. All meetings will be held in Textile Hall and at the same time there will be held the Carolinas Pharmaceutical Show which promises to be the best display of drug store goods ever held in the South.

VIRGINIA PHARMACEUTICAL ASSOCIATION OPPOSES SOFT DRINK TAX.

Secretary A. L. I. Winne of Virginia Pharmaceutical Association has addressed the

members relative to a proposed tax measure on soda fountain beverages, asking their coöperation in opposing the enactment.

BOSTON DRUGGISTS' ASSOCIATION.

The announcement of the February meeting of the Boston Druggists' Association includes a history of the Association from the beginning in 1875. Many who have passed over and were prominent in American pharmacy during the early period of the American Pharmaceutical Association are named as members—Metcalf, Sheppard, Canning, Burnett, Markoe, etc. Coming up to a later day the names of those still with us grace the pages.

SCHOOL OF PHARMACY, MEDICAL COLLEGE OF VIRGINIA.

Philip F. Fackenthall of the Department of Botany and Pharmacognosy School of Pharmacy, Medical College of Virginia, has undertaken to plot the state of Virginia by counties for the medicinal drug plants indigenous to this section.

DEDICATION CEREMONIES OF THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.

The Philadelphia College of Pharmacy and Science dedicated the recently purchased grounds for college purposes on Founder's Day, February 23. Various departments of city and state, medical and pharmaceutical organizations were officially represented. A luncheon at the Bellevue-Stratford followed the dedication ceremonies, when the very encouraging results obtained thus far for building and endowment funds were reported.

THE PHARMACIST AND THE LAW.

NINE MONTHS' RELIEF.

Under above caption the Philadelphia *Public Ledger* comments editorially: "The most abused and criticized, the most helpless and befuddled Congress in a generation has passed into history, and few there be who mourn. For the first time in weary years the country may now look forward to nine months free from the grinding of the legislative mill and untroubled by fear of what Congress may or may not do."

The next Congress is more or less an unknown quantity—a year hence we may be looking back on the preceding with some regret, but we assume it is safe to say "at the prospect of nine months' relief the country draws a deep breath," but we still have with us decisions and regulations and state legislation.

DILL PICKLES NEXT.

The Texas Legislature is considering legislation to outlaw the cigarette. Part of a *Dallas News* editorial is quoted:

"Now is the time for every addict to dill pickles to rally to aid of his delicacy. The Legislature is considering, more or less seriously, the outlawing of the cigarette. The number of cigarette fiends who have come home and beaten up their wives while deprived of their normal rationality through the fell effect of the demon nicotine is of course discouraging. But if cigarettes have wrought all these evils, what shall we say of dill pickles? Dill pickles likewise may be classified more readily as a habit than as a food, perhaps. But your dill picklist is bound to have his dill pickles. Dill pickles in moderation, of course, are compatible with a reasonable compliance with the responsibilities of citizenship. But after a man takes to dill pickles in excess his days are numbered and his corpse is measured for the last time."

Between too much legislation and too much dill pickles, any dill picklist can best stomach the pickles. Perhaps it is the same with cigarettes.

Governor Neff of Texas vetoed a bill last month because it contained a sentence of about 700 words; there were also other reasons for his action.

TO BE SAFE—DINE ALONE.

The *New York Commercial* states that "the New York State Trade Commission bill will, if enacted by the Legislature, bring within the jurisdiction of the commission any group of two or more who agree to subscribe for a dinner, or who combine to share the expense of a community delegation appearing before a commission or legislative committee, and the members of any such group who proceed to act without first obtaining a license from the proposed Commission of Trade and Commerce will be guilty of a crime, punishable by imprisonment for not less than three months and with the possibility of a fine in addition."

THE SALOON DRUG STORE.

A discussion of prohibition enforcement at the Philadelphia Club engaged Rev. H. M. Chalfont of the Anti-Saloon League and Charles S. Wood. Entering the discussion, our fellow-member, Ambrose Hunsberger,

former president of the N. A. R. D., referred to the number of saloon drug stores in the larger cities throughout the United States. After these references he said in part:

"I am taking no side in this discussion, only stating conditions as they exist in what was only a short time ago an honorable and most useful branch of industry. The saloon drug store has taken root in America and is growing like poison ivy. Its profits are far greater than the honestly conducted establishment and it is shown great consideration by grafting prohibition enforcement officers, while we who don't want to handle whisky are harassed and penalized. The bootlegging druggist pays small heed to regulations. He makes out at the beginning of the year his reports for each of the twelve ensuing months and has them ready at the appointed time, while we who conscientiously attend to our duties must give up a day or more in each month to make up the complicated and burdensome reports."

THE WOOD-ERNST MEASURE DID NOT MATERIALIZE.

The Wood-Ernst bill, providing for a separate and independent prohibition bureau directly under supervision of the President, did not pass. It is safe to say that the frank, open, energetic coöperative opposition of the drug interests halted the bill. Part of the discussion during the hearing was very warm; even Mr. Wheeler lost his habitual calmness.

STATE LEGISLATION AFFECTING PHARMACY.

Druggists of Alabama are opposing proposed legislation favoring practice of chiropractic.

Arkansas druggists are seeking legislation which requires high school graduation as prerequisite to state board examinations.

The California Legislature is discussing amendments to the Pure Food and Drug Law; a bill for malarial control; a bill providing for the regulation of medical, dental and pharmaceutical practice, and another seeks to reduce the number of members of State Board of Pharmacy.

Iowa druggists are opposing consolidation of state examining boards.

Kansas druggists are seeking to improve the state pharmacy law; Jno. W. Alford, formerly in the drug business, sponsored the bill.

A Minnesota bill provides for placing arsenical poison on the open market.

A State of Washington measure would prevent the sale of iodides, mercurials, etc.

An annual registration fee of $25.00 is the requirement of a Wisconsin soft drink bill.

Texas has defeated a fountain tax and also a bill which prohibited the sale of flavoring extracts and perfumes containing more than 2 per cent. of alcohol.

Utah has several pharmaceutical bills—one provides for graduation of pharmacists, prohibits licensing of a person convicted of violation of narcotic or liquor laws; a second, registration of all pharmaceutical establishments; a third prohibits sale of alcohol denatured with mercuric chloride.

NARCOTIC SEIZURE ON SHIPS URGED BY FEDERAL OFFICIAL.

An international agreement permitting the right of search, seizure and confiscation of drugs found illegitimately on shipboard, in the same manner that international law sanctions seizure and confiscation of contraband of war, is recommended by Frank R. Eldridge, chief of the Far Eastern Division of the Department of Commerce. This is the only practicable means to strike an effective blow at the drug menace in foreign trade, in the opinion of Mr. Eldridge, who is Secretary Hoover's technical representative on the Federal Narcotics Control Board.

PUBLIC STATEMENTS BY GOVERNMENT OFFICIALS RELATIVE TO NARCOTIC SALES SHOULD BE CAREFULLY WORDED.

The Detroit Times of February 18 states that Director William J. Burns, of the Bureau of Investigation, U. S. Department of Justice, made the following statement: "We find druggists everywhere willing to take the last shilling of the dope addict and to continue looking for new customers." We have not seen a copy of the issue of the *Times* referred to, and are advised that a letter bearing on the subject has been addressed to the Department, and this brief reference is made before a reply has been received. No one can be more interested than pharmacists in the regulation of the sale of narcotics, nor have any organizations given more serious thought and sincere effort than those of the drug trade to the study of ways and means for regulating the dispensing of narcotics—it is safe to say that this is the source of the effective suggestions for framing anti-narcotic laws. Certainly the Department is aware of these facts and hence, in our opinion, an explanation will be forthcoming.

BOOK NOTICES AND REVIEWS.

The First Century of the Philadelphia College of Pharmacy. 1821–1921. Joseph W. England, Editor. Pp. 728. With numerous illustrations. Published by the Philadelphia College of Pharmacy and Science, 1922.

It is not often that an opportunity is afforded for reviewing the history of an American educational institution whose activities have been continued uninterruptedly for a period of a century. In the case of an institution which has been devoted more specifically to instruction in the science and art of pharmacy the circumstance becomes unique, for the Philadelphia College of Pharmacy was the first among the kindred schools and colleges of our land to establish a course of systematic pharmaceutical education. Its record of achievement, as portrayed in the volume which has now been issued, is one which reflects the highest credit upon all who have been instrumental in its development. From the time of the inception of the college in 1821 through all the intervening years it has been sustained by a long list of able men who have devoted their talents and energies, either as teachers or administrators, to its advancement and to the promotion of those principles of professional practice which were embodied in the declaration of its founders. The benefits to be derived from the courses of instruction provided by the college were evidently foreseen at an early date, for its motto, as represented on the title page of the present work, is *Nosse haec omnia salus est.*

In complying with the request to prepare a review of the book under notice, the writer has been conscious of the difficulty which attends the satisfactory fulfilment of such a task. The selection made for this purpose was doubtless suggested by the fact that fifty years ago the writer of these lines had the honor to be inscribed as a student at the Philadelphia College of Pharmacy and that he thus had the privilege of a personal acquaintance with many of those who at that time and during the intervening years were intimately associated with it. An attempt to present an outline of the contents of this historical volume is therefore a pleasant duty, and it is one which is approached with a sense of admiration akin to reverence for the teachers who in early years imparted so much of inspiration, while many of the portraits which embellish the work visualize a group of personal friends with whom most happy memories are associated.

A brief synopsis of the contents of the volume under notice may serve to indicate its character and scope. The subject matter has been divided into thirteen chapters, which have the following titles:

Chapter I—Philadelphia and Pharmacy in 1821.

Chapter II—Founding of the College.

Chapter III—In a Home of Its Own—Zane Street Building (1832–1868).

Chapter IV—Ethical Standards and National Associations.

Chapter V—From Zane Street to North Tenth Street.

Chapter VI—Progress and Achievements of the Past Fifty Years.

Chapter VII—Alumni Association of the College; Its Origin and Work.

Chapter VIII—Merging of the Department of Pharmacy and Chemistry of the Medico-Chirurgical College with the Philadelphia College of Pharmacy.

Chapter IX—American Journal of Pharmacy.

Chapter X—Centennial Year.

Chapter XI—Officers, Trustees, Executives and Faculty of the Philadelphia College of Pharmacy.

Chapter XII—Biographical List of Graduates of the Philadelphia College of Pharmacy, and of the Department of Pharmacy and Chemistry of the Medico-Chirurgical College.

Chapter XIII—Alphabetical List of Graduates of the Philadelphia College of Pharmacy, and of the Department of Pharmacy and Chemistry of the Medico-Chirurgical College.

It would be impossible to give any adequate description in further detail of the large amount of valuable and interesting information which has been included in this work, for the history of the Philadelphia College of Pharmacy represents to a large extent the development of pharmacy on the American continent. With this development may be considered the production of the United States Pharmacopœia, the United States Dispensatory, and the organization of the American Pharmaceutical Association. Such an historical record of the activities of the college cannot fail to be of absorbing interest to all its former students and to those who at various periods have been associated with it, while its value to succeeding generations should be correspondingly enhanced.

It is assuredly the wish of all who are conversant with the history of this honored institution, and especially of those who have received instruction within its walls, that it shall continue to maintain the best traditions of the past while seeking to extend its sphere of influence for the diffusion of useful knowledge. In accordance with this desire the hope may be entertained for a constantly increasing measure of prosperity and success.

The completion of such a laborious task as the compilation of this historical record has involved is an occasion when congratulations may justly be extended to all those concerned in its production, and particularly to its editor. It is gratifying to note its typographical excellence and the clearness with which the numerous illustrations have been produced, while the very complete index will greatly facilitate reference to its contents.

F. B. POWER.

The Theory of Emulsions and Emulsification. By William Clayton, D.Sc., F.I.C.; foreword by Professor F. G. Donnan, C.B.E., M.D., Ph.D., D.Sc., F.R.S. P. Blakiston's Son & Co., Philadelphia, 1923.

For anyone who is interested in the subject of emulsions in a general way, this volume is a most compact and comprehensive work because not only does it contain all the information which has been gathered on the subject but the various phases of the subject have been separated from the mass of related matter which one usually finds in textbooks on Colloid Chemistry.

To those who contemplate doing research work on the subject of emulsions, this little book is invaluable as every bit of research which has been done toward the development of an adequate and complete theory of emulsions is discussed therein and complete references are given in every case to the original work published.

The text of the book gives in a very clear and concise fashion the various theories of emulsions and emulsification which have been advanced and which for one reason or another have been found unsound or insufficient, and finally leads up to the modern absorption film theory which seems to be broad enough to embrace and explain the results which have been obtained in working with all classes of emulsifiers, in both the oil-in-water-type and water-in-oil-type of emulsions.

The author then devotes a chapter on the laboratory methods of physical measurement of emulsions and then discusses the few known factors which influence the process of emulsification.

The final chapter deals with deëmulsification which has had very important technical application in the breaking up of oil-field and condenser water emulsions.

In the back of the book is given a complete bibliography of the papers which have been written on emulsions to date and these are arranged in chronological sequence so that, whether interested in the physical and mathematical aspects or the physiological, pharmaceutical and other practical phases, one can find all the published work in his own special field in the order in which it was developed.

One cannot help but feel in reading this book that only the surface has been scratched of this important branch of Colloid Chemistry; that tremendous theoretical interest and practical possibilities lie in the study of emulsions, since the ordinary things about us such as milk, butter, soaps, medicinal emulsions and innumerable others are all items in the field of emulsions, each of which is a special and intricate study in itself. The possibilities in research work in the field of pharmaceutical emulsions are especially bright, as to-day the whole subject is founded on an empiric basis. To the pharmaceutical chemist as well as to specialists in other technical fields, and to students, this book is strongly recommended for the concise manner in which the subject is presented.

LEO ROON.

Catalysis with Special Reference to the New Theories of Chemical Action. A General Discussion. Reprinted from the Transactions of the Faraday Society, Vol. XVII, Part 3, May 1922. The Faraday Society, London.

At the meeting of the Faraday Society held on September 18, 1921, in the Hall of the Institution of Electrical Engineers, Victoria Embankment, London, a general discussion took place on "Catalysis with Special Reference to Newer Theories of Chemical Action." The symposium was divided into two parts. The afternoon session was devoted to "The Radiation Theory of Chemical Action" and consisted of the following papers: "Radiation and Chemistry," by Prof. Jean Perrin of the Sorbonne, Paris; "The Radiation Hypothesis of Chemical Reactivity and Some of Its Applications," by Dr. W. C. McC. Lewis, Brunner professor of physical chemistry in the University of Liverpool; "The Theory of Chemical Reaction and Reactivity," by Prof.

E. C. C. Baly, F.R.S.; and "Is a True Monomolecular Action Possible?" by Prof. T. Martin Lowry, D.Sc. The following noted authorities took part in the discussion of these papers: Prof. F. A. Lindemann, Prof. Svante Arrhenius, Dr. Irving Langmuir, Dr. N. R. Dhar, Prof. J. Perrin and Prof. W. C. McC. Lewis.

The evening session was devoted to "Heterogeneous Reactions" and consisted of the following papers: "Chemical Reactions on Surfaces," by Dr. Irving Langmuir of the Research Laboratory of the General Electric Co., Schenectady, N. Y., and "The Mechanism of the Catalytic Action of Platinum," by the same author. In the discussion on this subject the following noted authorities took part: Dr. Eric Rideal, Prof. Wm. A. Bone, Dr. G. Ingle-Finch, Prof. E. C. C. Baly, Prof. W. C. McC. Lewis, Prof. Edwin Edser, Dr. E. F. Armstrong, Dr. T. P. Hilditch, Dr. H. E. Holtorp and Dr. Irving Langmuir.

A remarkable and historical meeting in which not only scientists of Great Britain but of three foreign countries took part; namely, Prof. Arrhenius of Sweden, Prof. Perrin of France, and Dr. Langmuir of the United States. Every one interested in this subject should not fail to read this book.

OTTO RAUBENHEIMER, PH.M.

Isotopes. By F. W. Aston, M.A., D.Sc., A.I.C., F.R.S., Fellow of Trinity College, Cambridge. Octavo, 152 pp., 21 figs., 4 plates. Cloth, $3.00. Edward Arnold & Co., London, and Longmans, Green & Co., N. Y. City, 1922.

Toward the end of the last century the attitude of science in relation to the atomic theory started to undergo a complete and radical change. What had been before regarded as a convenient working hypothesis became with remarkable rapidity a definite statement of fact. The causes of this remarkable advance are to be ascribed in particular to the discovery of radioactivity.

Dalton in his Atomic Theory in 1803, the foundation of the modern chemistry, laid down five postulates, the validity of only one is in question, *i. e.*, "Atoms of the same element are similar to one another and equal in weight." The chemist who above all others urged the possibility of the heterogeneity of atoms was the late Sir William Crookes. His address to the Chemical Section of the British Association at Birmingham in 1886 should be read by all those interested in the history of scientific thought. The result obtained from the radioaction elements introduced a wealth of new and revolutionary ideas. One of these was that elements might exist which were chemically identical but yet different in radioactive properties and even in atomic weight. In 1913, again in Birmingham, 27 years after Crookes made his prophetic remarks about atomic weights, papers were read in different sections of the British Association, one on the Radioelements and the Periodic Law, the other on the Homogeneity of Neon, both of which proved that substances could exist with identical, or practically identical, chemical and spectroscopic properties but different atomic weights. The need for a specific name for such substances soon became imperative and Soddy suggested the word "Isotopes" from the Greek "isos" equal, and "topos" place, because they occupied the same place in the periodic table of the elements.

The author has made wonderful researches in this new chemistry, which are laid down in the present monograph, which is well and abundantly illustrated with plates and figures. The book affords a ready means of becoming familiar with one of the most important developments in chemistry since the time of Dalton, namely, the subject of "Isotopes." Surely chemists and also pharmacists should be somewhat acquainted with this subject!

OTTO RAUBENHEIMER, PH.M.

THE SYNONYMY OF PEPPERMINT AND ITS PARENTS.

Conference Bulletin No. 2.

Since the first bulletin* was issued, additional material has been promised for these researches. Prof. Asahina of Tokyo University has secured authentic Japanese peppermint plants, for which the U. S. Dept. of Agriculture has granted an importation license. Mr. Norbert Miller, of Todd & Co., who recently visited Madison to discuss various phases of the research, has promised to supplement an earlier shipment by a much larger quantity of the first runnings of peppermint oil.

Dr. E. W. Washburn, of the National Research Council, was another recent visitor. We feel that a closer and more helpful relationship with the Council has been established.

At the Research Conference of October 13th, Mr. F. J. Bacon, who holds the A. M. Todd Fellowship, reported the preliminary results of his studies on the synonymy of peppermint and its parents.

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* See page 1080, December 1922.

Mentha piperita (L. ex parte) Huds.,[1] or peppermint, is generally believed by most recent authors to be a hybrid plant resulting from a cross between *Mentha spicata* L. and *Mentha aquatica* L. It is supposedly sterile; fruits are rarely formed and then are not fully developed. The plants propagate by their rhizomes.

The types of *Mentha piperita* are classed in the following groups:[2]

Group I (sub-species *piperita* Briquet) resulting from

M. aquatica L. > × < *M. spicata* L.

M. aquatica L. × < *M. spicata* L.

(1) *M. piperita* var. *officinalis* Sole.

(*a*) *M. piperita* Huds. var. *officinalis* Sole forma *pallescens* Camus.[3]

(*b*) *M. piperita* Huds. var. *officinalis* Sole forma *rubescens*[4] Camus.

(2) *M. piperita* Huds, var. *inarimensis* H. Braun.

(3) *M. piperita* Huds. var. *Durandoana* Briq.

(4) *M. piperita* Huds. var. *globosiceps* Briq.

Group II (sub-species *citrata* Briq.) resulting from

M. aquatica L. × < *M. spicata* L.

(1) *M. piperita* var. *citrata* Briq. the *Mentha citrata* of Ehrh.

Relative to the forms of peppermint listed, *Mentha piperita* (L. ex parte) Huds. (*M. piperita officinalis* Koch) has been divided into two varieties by Sole. A few of the common synonyms of the varieties by various authors are listed to illustrate the synonymy.

Var. 1. *Officinalis* Sole. *M. piperita* Smith; *M. officinalis* Hull; *M. piperita* Boreau; *M. viride-aquatica* F. Schultz; *M. Pimentum* Nees; *M. sylvestris* var *piperita* Reichb.; *M. liabrata* Vahl.

Var. 2. *Vulgaris* Sole; *M. piperita* Hull; M. *piperita* Smith.

Index Kewensis lists seventeen species, by various authors as synonymous with *M. piperita* L.

The following synonyms for *Mentha spicata* and *M. aquatica* are given as follows:

Mentha spicata L. 1753; *M. viridis* L. 1763, Smith, Sole, Boreau, Wirtgen; *M. sylvestris glabra* Koch; *M. sylvestris* var. *viridis* Coss. & Germ.; *M. viridis* var. *macrostemma* Lejune; *M. viridis* var. *piperita* Opiz; *M. crispata* Schrader; *M. sylvestris* var. *crispata* Koch.

Index Kewensis lists twenty-eight species, by various authors, as synonymous with *M. spicata* L.

Mentha aquatica L.; *M. hirsuta* DC.; *M. rotundifolia palustris* Bauh.; *M. aromatica* Opiz; *M. capitata* Gilibert; *M. odorata* Sole.

Index Kewensis considers *M. citrata* Ehrh. synonymous with *M. aquatica* L. and lists ninety other species, by various authors, as synonymous with *M. aquatica* L.

In general, hybrid plants have characters intermediate between those of the two parents. But as they are not necessarily alike, variations are found which approach more closely to either one or the other parent. Thus the French varieties of peppermint are considered to show more resemblance to *M. spicata* L. whereas the English varieties resemble *M. aquatica* L.[1]

The forms cultivated in America for the distillation of the oil are regarded by American authors[2] as *Mentha piperita* L., American Mint, and two varieties, *M. piperita* var. *vulgaris* Sole, black mint, and *M. piperita* var. *officinalis* Sole, white mint.

The above brief outline illustrates the complexity of the synonymy of the mint plant from a botanical standpoint. An effort is being made to secure the original descriptions of the older authors on the mints such as Briquet, Bentham, Sole, F. Schultz and others, for comparison and use in connection with our field studies.

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[1] The name *Mentha piperita* Hudson seems to be most generally accepted by the older authorities on the mints. However, the name *Mentha piperita* Linnaeus is in use and appears to be the same plant.

[2] A. & E. G. Camus—Bulletin of Roure-Bertrand Fils, Oct. 1911, p. 3.

[3,4] Corresponding to the white and black varieties cultivated in England.

POTASH IN THE GREENSANDS OF NEW JERSEY.

Bulletin 727 of the United States Geological Survey deals with the greensands of New Jersey as a source of potash. The section extends from Sandy Hook to Salem, and the width varies from less than a mile to fourteen miles. An estimate gives the possible yield of potash from these sources at 250 million tons.

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[1] E. M. Holmes, Perfumery and Essential Oil Record 2, p. 11.

[2] Miss Alice Henkel, Dept. of Agric. Bull. No. 90, p. 5.